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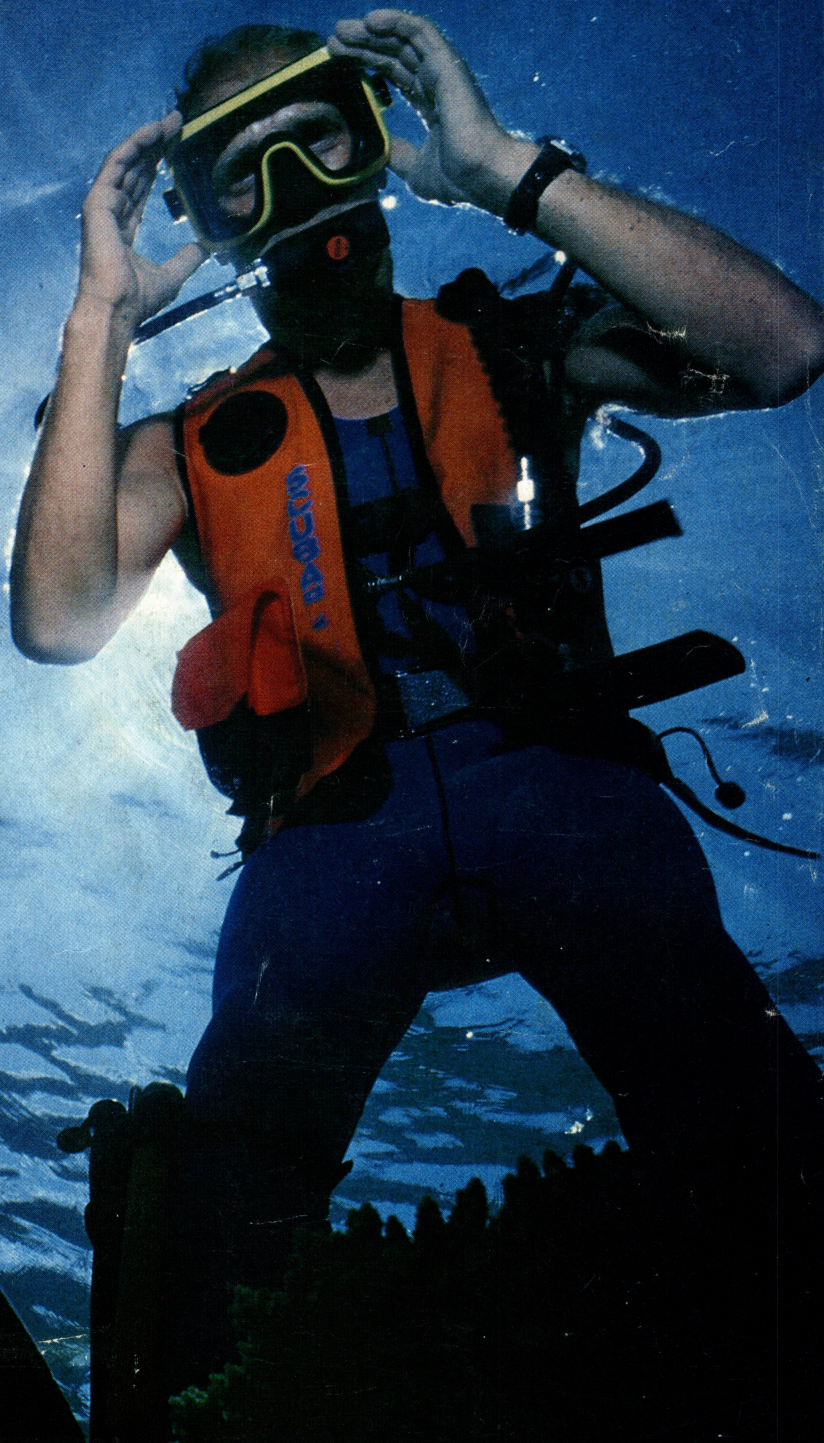
EAGLE RAY SQUADRON
AT SOUTH CAICOS

SHOOTING THE PASS
AT MANIHI

OVER THE WALL
AT CHUB CAY

TAMPA BAY'S
BIG FISH REEFS

PADI
FROM THE INSIDE OUT



SEA PRODUCT REPORT: INSTRUMENT CONSOLES

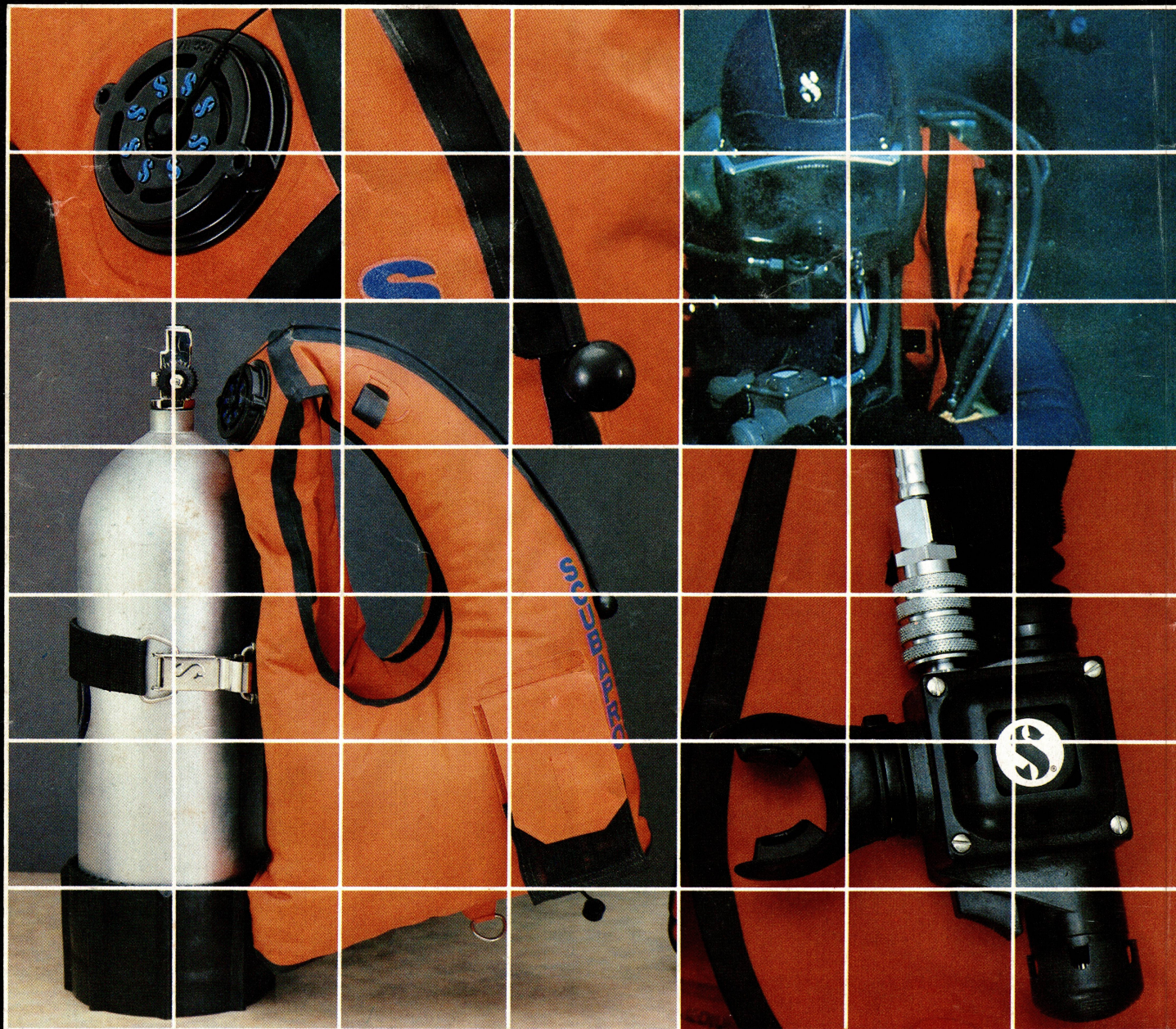
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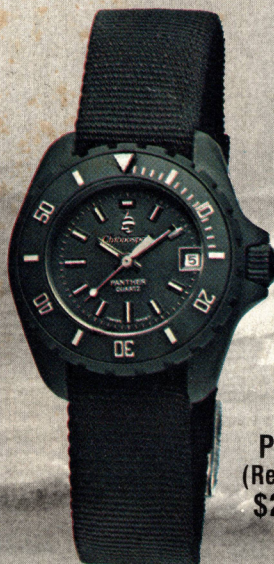
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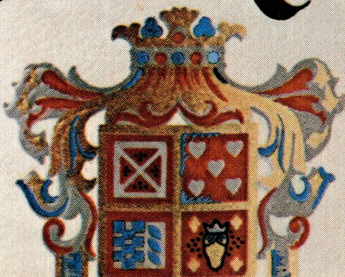
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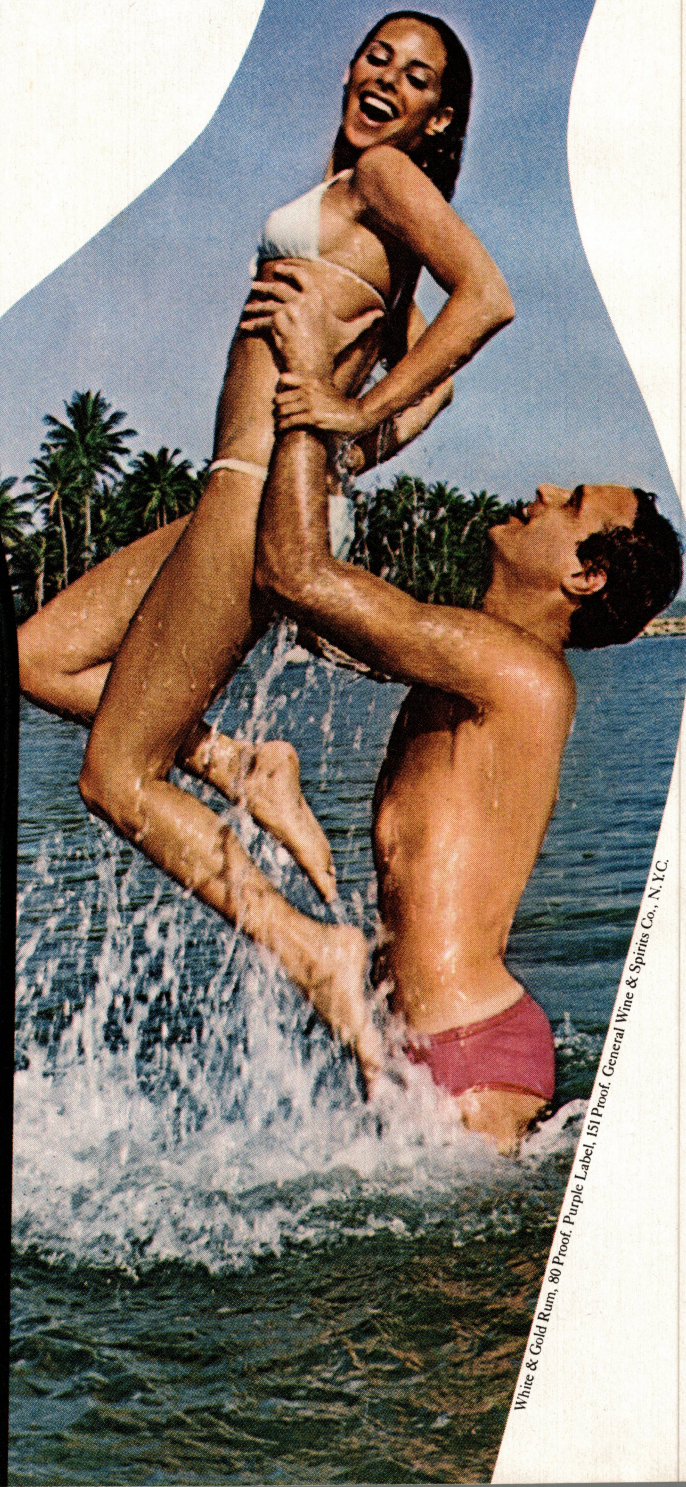
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Colin Lewis, dive administrator of the Heron Island Resort, stands on the edge of a coral drop-off in three feet of water at the Blue Holes off Queensland, Australia. The photograph was taken by Geri Murphy.

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SDM Editorial

BY THE PUBLISHER



TANK TAMPERING IS A NO NO!

Ever since the first scuba tank was produced more than 30 years ago, divers have been trying to paint them. The abrasive combination of sun, sand, sea and rocking boats has a devastating way of ruining even the most durable finish. Within months, most tanks show evidence of hard wear. Scratches, gouges, pits and blisters produce an unsightly appearance and many tank owners seek a method of refinishing their tanks. In many of the tropical resort areas, tanks are usually repainted twice a year to prevent rusting or other damage to the tank exterior.

I would guess divers have tried just about every possible paint preparation known to man. Their refinishing attempts span the entire spectrum of hard enamels, fancy lacquer coatings, epoxy paints, vinyl dips and more. Until recently, this preoccupation with tank painting had not been much of a problem. Unfortunately, new technologies in one industry can sometimes create serious problems for another. This has just happened to the world of diving.

Late this spring, two Florida divers felt the need to repaint three aluminum scuba tanks. They took their tanks to a powder paint company which specialized in a new process for achieving an extremely durable paint coating.

First, the tanks were sandblasted to remove all traces of the original factory paint job. Next, the tanks were magnetized with an electrostatic charge, and a metal-type paint powder was sprayed onto them evenly. Finally, the three tanks were placed into an oven and baked at 340 to 400°F for approximately 40 minutes. The divers were not familiar with the bake-on procedure, and the paint com-

pany knew nothing about scuba tanks and the tremendous pressures involved. The paint company had never treated any scuba tanks before.

Sometime after the refinishing was completed, one of the two Florida divers took his newly painted tank to a dive shop for filling. It exploded before reaching the designated working pressure and injured five people who happened to be in the dive store at the time. The employee filling the tank suffered a broken arm and other injuries, but luckily survived the experience. The blast ripped through the sidewall of the dive store and shattered the front window. The store's interior was a shambles.

Four days later, the other Florida diver took his two tanks into another dive shop for tank inspection and filling. The first of these two tanks also exploded while being filled. The dive store owner lost both his legs in the accident. Needless to say, this dive store was also demolished.

These two tragic scuba tank accidents in less than one week caused shock waves throughout the dive industry. Dive equipment manufacturers and distributors suddenly focused their attention on an entirely new hazard which never before existed. This was the first time that scuba tanks had exploded as a result of a paint job!

What exactly happened in the case of these two explosions? Very simply, the oven bake-on process used for paint refinishing had destroyed the tensile strength of the scuba tanks involved. When aluminum alloys are heated to temperatures of 300° to 400°F, the molecular structure of the metal is changed and it becomes brittle. While these heat-damaged scuba tanks may have ap-

peared perfect they were no longer the same sturdy pressure vessels they were prior to the painting process.

As a result of investigations and studies of the damaged tanks involved, both the Dacor Corporation and U.S. Divers Company have issued warning bulletins to dive stores, dive resort operators and all scuba instructor associations. These companies are warning divers not to use paint or refinishing processes which involve high temperatures for curing or baking. They are also recommending that compressor operators be careful of freshly painted tanks, and verify that a hydrostatic test was completed after the new paint job. These warnings apply to all dive cylinders regardless of whether they are aluminum or steel.

Luxfer USA, Limited, also published a warning bulletin recommending discontinued use of any aluminum scuba tank which has been subjected to any sort of action by fire. An aluminum cylinder which has come in contact with temperatures higher than 350°F should be immediately condemned. If there is any question about the degree of heat or damage involved, a new hydrostatic tank test should be conducted prior to filling.

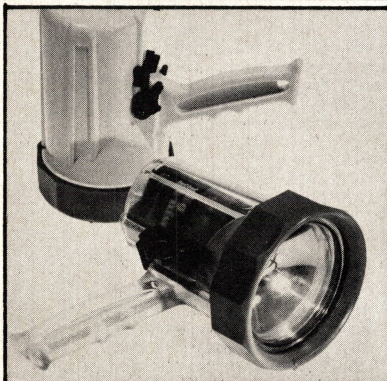
If you have a scuba tank which you suspect has been painted with a bake-on process, have it hydrostatically tested before filling or further use. If you are planning to have your scuba tank repainted, be sure that no heat is applied to the tank. If you are in doubt about the paint process you intend to use, discuss the matter with your local dive shop owner or contact the manufacturer. Tampering with a scuba tank, and its finish, can be a shattering experience for both the tank and its owner. ➤

STANDARD



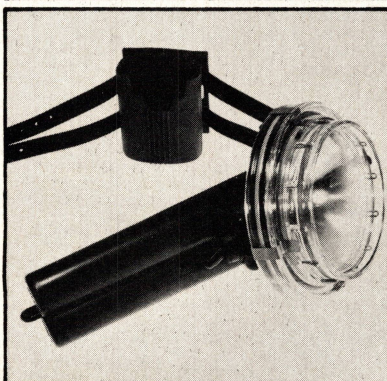
MINI C-LITE I

The Mini C-Lite I, 5" long x 3" diameter is designed to operate with 4 "C" cell alkaline batteries (not included) and a standard flashlight bulb. This combination provides 4 to 6 hours of light with twice the intensity and coverage of similar size lights. A rotating ON/OFF switch offers easy one hand operation. The light's size and the optional (#1056) rubber holster offer unlimited mounting applications. Lite is available in black, clear or orange.



IKELITE II

The total concept of this Lite is simplicity in design, for trouble free performance and long life. The IKELITE II features a unique ON/OFF switch and lock. The lite operates from a standard 6 volt battery (not included) and a #4546 sealed beam bulb. Unquestionably the brightest and most dependable diving light in its price range. Lite is available in black, white or clear.



C-LITE I

This Lite offers 50% greater intensity than lantern battery powered lights. The special sealed beam bulb requires six "C" cell alkaline batteries and produces 10,000 initial candle power as compared to the 6,000 candle power of our IKELITE II (non-rechargeable) and other lantern battery powered lights. The compact size and unique shape offer easy one hand operation. This Lite can easily be carried on all dives in the Optional (#1055) C-Lite Holster.



MODULAR I LITE

This Lite utilizes six inexpensive "D" cell flashlight batteries (not supplied), to provide intensity unequalled by any popular priced diving light. Lite can be converted to Modular X, SuperLite, or MovieLite. Available in black or clear.

MODULAR X LITE

This Lite utilizes a more powerful bulb which requires six alkaline "D" cell batteries. This combination produces an intensity almost equal to rechargeable lights in the \$100 price range. Lite can be converted to SuperLite or MovieLite. Available in black or clear.

RECHARGEABLES

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This new lite offers the same features as the Mini C-Lite I, compact size, virtually indestructible case, unmatched intensity, one hand ON/OFF control, plus 4 "C" cell nickel-cadmium batteries and charger. The nickel-cadmium batteries provide a constant intensity for approx. 2 hours on a full charge and recharge in 12 to 16 hours. The Lite's size and the optional (#1056) rubber holster offer unlimited mounting applications. Lite is available in black, clear or orange.

IKELITE II

A rechargeable Lite in the mid-price range. This new Lite offers the same unique features as the famous IKELITE II, plus a rechargeable gel-cell battery and charger. The gel-cell battery is considerably more powerful than a standard lantern battery. It powers a special #4645 lamp, producing four times the intensity of lantern battery lights. The gel-cell battery provides a constant intensity for approx. 2 hours on a full charge and recharges in 10 to 15 hours. Lite is available in black or clear.

C-LITE II

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Diver's Calendar

June 2-July 31 Treasure of the Concepcion, on exhibit at the Hershey Museum of American Life, Hershey, PA. (Contact: Hershey Museum of American Life, 300 Park Blvd., Hershey, PA 17033; (717) 534-3439)

August 7-10 Third annual People Interested in Diving Treasure Hunt, co-sponsored by the Sunken Treasure Dive Shop. (Contact: Rich Best, Sunken Treasure Dive Shop, RD#4, Jersey Shore, PA 17740)

August 28-29 San Diego Underwater Photographic Society's 17th Annual Underwater Film Festival. Staged at the San Diego Civic Theater, San Diego, CA. (Contact: UPS, P.O. Box 82782, San Diego, CA 92138; or call Zona Wahrenbrock at (714) 273-1224)

September 5-7 Montana State Dive Festival, Holland Lake Lodge, Seeley Lake, MT. Lectures on dive safety and high altitude dives. (Contact: Ken Stevens, 3711 Third Ave. N, Great Falls, MT 59401)

September 25-26 Fifth Annual Cayman Party, Houston Oaks Hotel, Grand Cayman, BWI. Slide presentations and dive music by Barefoot Man and his band. (Contact: The Cayman Party, Box 1249, Grand Cayman, BWI)

September 26-27 Sixth Annual Sonoma County Diver Rescue Workshop, Santa Rosa Junior College, Santa Rosa, CA. (Contact: Sonoma County Diver Rescue Workshop, P.O. Box 3967, Santa Rosa, CA 95402, Attention: Mel Cumins — Send a self-addressed envelope with 36¢ postage)

October 4-9 In-Depth Diving Seminar on Catalina Island, CA. Presentations and practice sessions on advanced dive skills. (Contact: Jon Hardy, Argo Diving Services, P.O. Box 1201, Avalon, CA 90704; (213) 510-2208)

October 18-23 Recognition and Management of Diving Casualties course, Travelodge Tower, San Diego, CA. (Contact: Edith Bookstein, Office of Continuing Education, M-017, UCSD School of Medicine, La Jolla, CA 92093)

October 21-23 Annual meeting of the North Pacific Chapter of the Undersea Medical Society, Benson Hotel, Portland, OR. (Contact: Dr. Joseph A. Parent, Jr., Mt. Hood College Center, 10100 N.E. Prescott, Portland, OR 97220)

November 1-6 In-Depth Diving Seminar on Catalina Island, CA. Presentations and practice sessions on advanced dive skills. (Contact: Jon Hardy, Argo Diving Services, P.O. Box 1201, Avalon, CA 90704; (213) 510-2208)

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Dry dives to 190 feet can be experienced in the FIT chambers.

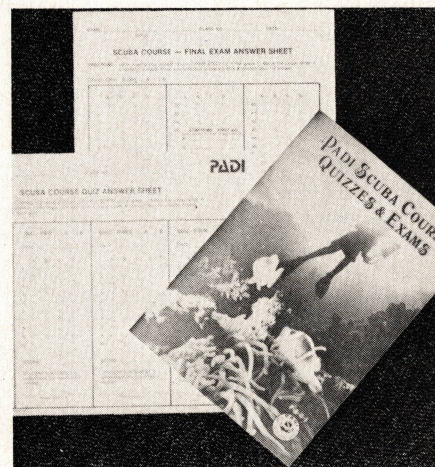
Seatech Seminar 81 is offered July 2 through 6 and September 7 through 11.

Interested persons can phone the Continuing Education Office at (305) 334-4200, extension 79. The seminar will be staffed by members of the Department of Underwater Technology.

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PADI has revised its beginning scuba course quizzes and exams. Printed in booklet form, each of the four modular quizzes has been shortened to ten questions. Separate answer sheets simplify paperwork by including spaces for an-



swers to all four quizzes plus the final exam. The quiz and exam booklets can be reused and the answer sheets ordered separately. Answer keys are provided with each order of quiz and exam booklets.

Quiz and exam booklets and answer sheets are available to PADI instructors from the Professional Association of Diving Instructors, 2064 N. Bush Street, Santa Ana, California 92706. 

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The fact is:

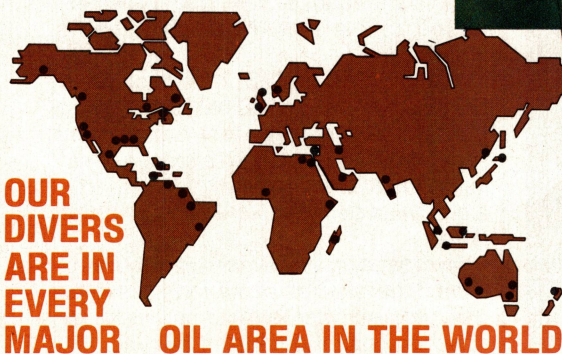
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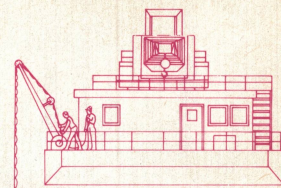
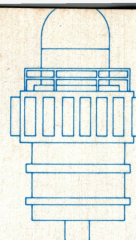
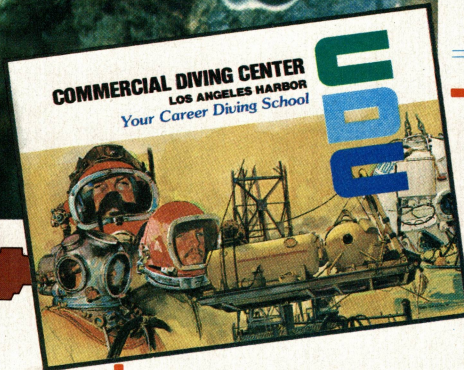
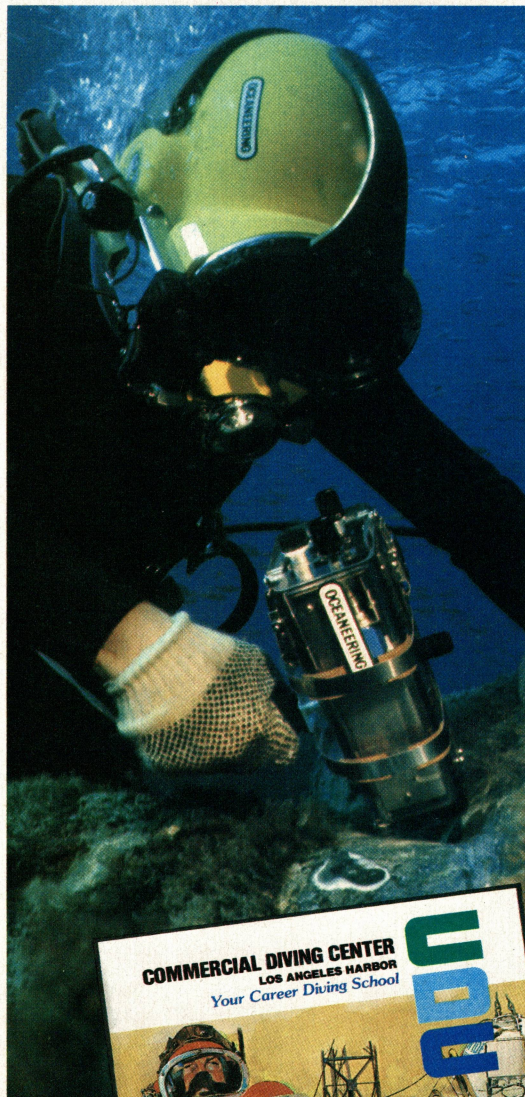
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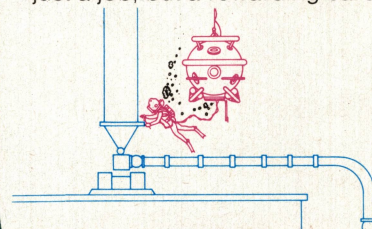
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ADVANCED DIVER PROGRAM

The Los Angeles County Advanced Diver Program is for the certified basic scuba diver who wants to receive more training in various aspects of sport diving.

ADP is a four month, 100 hour course, meeting during the months of July through October. Lectures are held on Friday evening covering specialized areas of diving such as marine life, shell cleaning, medical aspects, underwater photography, search and salvage, night



diving, etc. Ocean training will be on the following Sundays.

A detailed ADP information booklet will be available upon request by writing: County of Los Angeles, Department of Parks and Recreation, Aquatics Division, 155 W. Washington Blvd., Los Angeles, CA 90015; or phoning (213) 744-4341 — Aquatics. 🐠

NAUI LOWERS INSTRUCTOR AGE

The membership of the National Association of Underwater Instructors, Colton, California, has recently voted to reduce the minimum age for instructors from 21 to 18 years.

Divers who attended a NAUI ITC and met all requirements (when they were 18-21) are now eligible for immediate upgrading to instructor status.

Divers in this category should contact Jim Hicks, training director, at NAUI Headquarters, Box 630, Colton, CA, for further information. 🐠

TANK EXPLOSIONS

In April, two aluminum scuba tanks exploded while being filled in Florida dive shops. Both accidents resulted in serious injuries to many of those present. An investigation had not been completed as of this writing, but the tanks may have ruptured because they had been exposed to extreme heat while being repainted.

Luxfer USA, the U.S. manufacturer of aluminum scuba tanks, has circulated a bulletin warning scuba tank owners: *Any scuba tank that has been exposed to extreme heat for any reason, or has been in a fire, must be hydrostatic before being filled.*

Hydrostatic is the *only* way to determine if the strength of the tank has been affected: An internal/external visual inspection cannot determine this. 🐠

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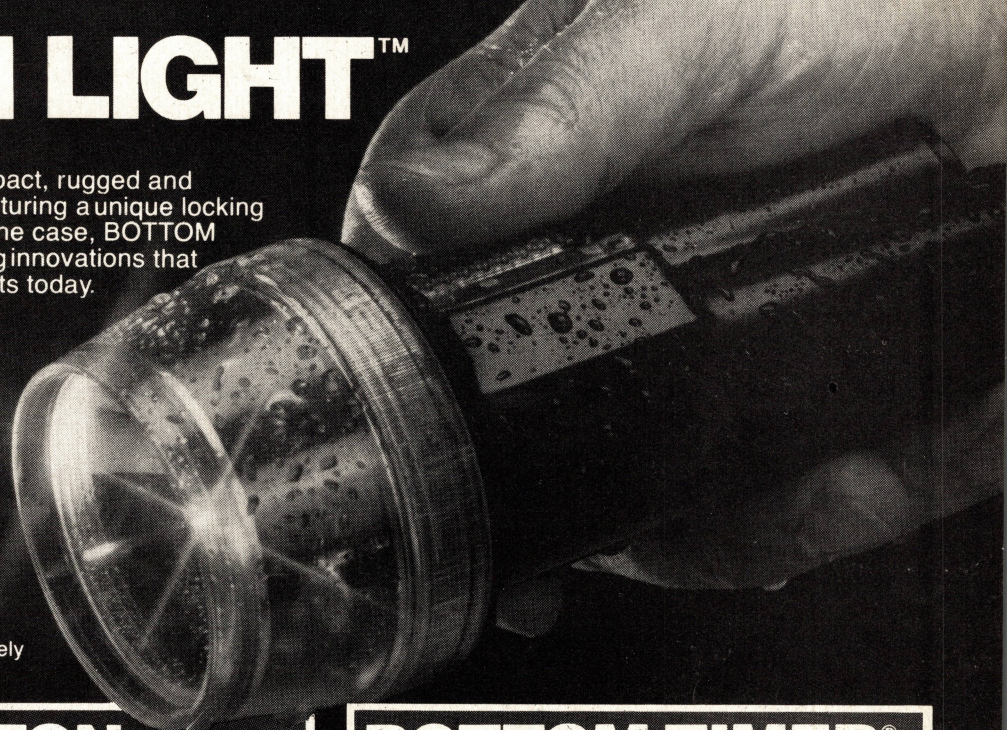
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The new PRINCETON TECTONICS watches have been designed with an eye to use, reliability and looks. Pictured here is the TEC 1800 which shares the following features with all the new Princeton Tectonics watches: Scratch resistant mineral crystal / Quartz movement / One-way ratchet-bezel with decompression stops / Recessed screw-down crown / Five year limited warranty / Stainless steel bracelet with double spring tensioners / Water resistant to tested depths (TEC 1800 is tested for 1800 ft. - other models vary). Finally, all PRINCETON TECTONICS watches will be repaired and serviced at our own plant - assuring prompt and meticulous technical back-up.



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DEALER INQUIRIES INVITED

Cavern Diving

BY SHECK EXLEY

The statistics are out, and for once they tell a happy story. According to figures recently released by the National Speleological Society's (Cave Diving Section) Accident Research Committee, the total number of fatalities in Florida caves in 1979 was the lowest in the past 15 years: An incredible reduction of 81 percent below the all-time high in 1974.

This remarkable turnabout is something of which the entire dive community can be proud, for we all helped make it possible. Dive equipment manufacturers now offer the most dependable scuba equipment in history, along with many of the essential accessories, such as lights, that are so important to safe cave diving. Cave owners like Bob Wray at Ginnie Springs, Tom McQuarrie at Blue Grotto, Doc Dockery at Vortex Spring and the Florida Division of Recreation and Parks have taken special steps to make sure that visiting divers understand special cave diving safety procedures. Training agencies and scuba instructors, more aware than

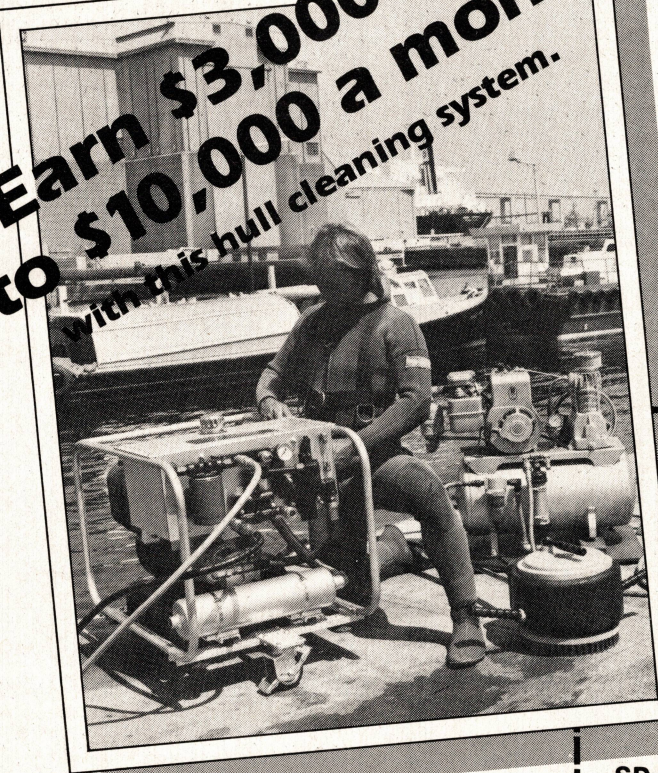
ever of the special risks inherent in cave diving, have made a special effort to get the word out to their students. The NSS Cave Diving Section has worked particularly hard over the past five years, holding 13 Cave Diving Safety workshops all over the country. The NSS has blitzed would-be cave divers with thousands of copies of its free safety brochure as well as its innovative mini-text *Basic Cave Diving*; installed underwater warning signs in all of the most popular cave entrances; designed and installed directional arrows on permanent guidelines in the caves; distributed safety maps of many caves; and, instituted a special award to encourage cave diving safety practices. And the NSS has continued to offer its popular, informative newsletter, *Underwater Speleology*, and several other cave diving safety publications.

However, as 1980 NSS cave diving section chairman, India Young, observes, "Our job isn't finished yet. Probably more than 100,000 divers will make at least one cave dive in Florida this year,

and even though only five persons drowned last year, that is still five too many." She hastens to add that it will take the combined efforts of all of us — instructors, manufacturers and publishers — to continue to improve the safety record.

Perhaps the most significant factor in the improvement of cave diving's safety record has been an innovative new approach to training, pioneered by NSS and PADI, called cavern diving. Sometimes called ledge diving, cavern diving refers to cave diving within a short distance of the entrance. More specifically, the cavern dive must be made within the area naturally lit by daylight and within a theoretical single-breath's distance of the surface so that the possibility of an emergency free ascent to the surface is retained. The single-breath's distance has been defined by the NSS and PADI as not to exceed 130 feet linear distance of the surface. For example, the limit for cavern diving in a cave 60 feet deep is 70 feet back. In keeping with other sport diver training, cavern dives also are to be

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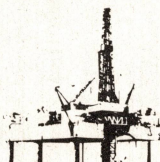
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CAVERN DIVING

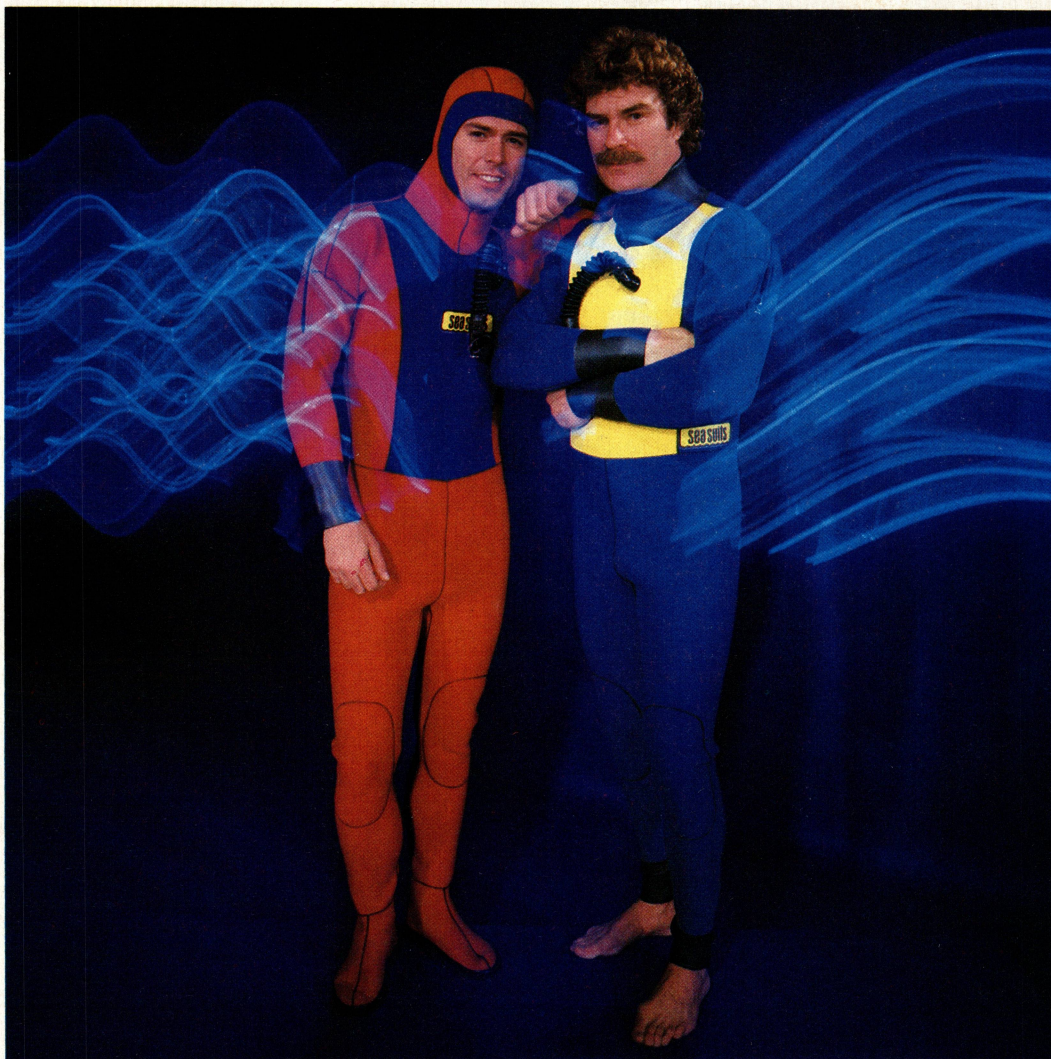
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A brainchild of PADI cavern diver program director, Rory Dickens, the concept of certified training in cavern diving has been further refined by NSS CDS training chairman, Forrest Wilson, so that the course can be taught and completed in a single weekend, a special plus for out-of-state divers. As a matter of fact, ever mindful of the difficulties newcomers have with cave guideline reels, Forrest even designed the first jam-proof reel to make it easier for novice cavern divers to operate one.

Cavern diver training solves two very important problems that have existed in cave diving instruction. First, with fewer than 400 cave divers certified by all agencies combined over the past decade, only a very small percentage of divers entering caves are exposed to training. Second, almost all of the persons enrolling in cave diving courses have already been cave diving despite the fact that statistics show the first few cave dives are the most dangerous. Since the cavern diver course is much shorter than a full cave diving course and the practice dives are also shorter and easier, the instructor can teach more often with higher student/instructor ratios in each course. The two-day duration of the course makes it easier for out-of-state divers to participate. Also, the fee charged for cavern diving instruction is modest and only a few items of equipment beyond those necessary for normal open water diving are required for cavern diving. Thus, the student is much more inclined to seek training before entering a cave than he/she would be when the \$300-\$500 cave diving course with its \$1000 plus of extra required equipment is the only option. An added incentive for preventing cave diving fatalities is the fact that almost all of the class theory covered in the full-blown cave diving course is covered in the cavern course. This is presented in such a way that the student is convinced of the need for additional training should he/she desire to penetrate further into the cave. Should he/she decide on further training, the student is already 25 percent of the way there: The cavern course is identical to the first two days of the eight day NSS Cave Diving Course.

Forrest Wilson says, "The cavern diving course is designed to be similar to a resort scuba diving course in that we show the student as much diving as possible under the careful guidance of an experienced instructor. We want him to have fun while he learns. The courses are informal, a lot of time is spent out-

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CAVERN DIVING

doors and we actually get in at least three cavern dives in three different caverns in the two days."

One highlight of the course is a field trip to a nearby air-filled dry cave. NSS instructor Mary Ellen Eckhoff observes, "For many this is the first time underground and it's a great opportunity to get used to the strange and delicate cave environment without the stress of being underwater at the same time. We discuss cave formations, darkness, the importance of cave conservation and even spend some time exploring the cave for those who want to do so. The explorers generally get pretty muddy but they love it, and after a dip in a refreshing spring to clean up, they're generally *rairin'* to go again."

Another NSS instructor, Dr. John Zumrick, thinks this concept of gradually introducing the diver to the strange underwater cave environment is extremely important in building student confidence and preventing panic. "From the air cave we proceed to a game where they follow a guideline through the trees in the woods with their eyes closed, much as they would have to do if their lights went out or sudden silting of the water occurred. Next we do the same thing in shallow open water under close supervision of the instructor. By the time the student gets into an actual underwater cavern, he is relaxed, confident and generally amazed at how easy it seems."

To say that the demand for cavern diving is growing by leaps and bounds is an understatement. Last year, for example, NSS instructors probably trained and certified more cavern divers than the total number of certified cave divers turned out by the cave diving programs of NSS, NAUI, YMCA, and National Association for Cave Diving combined.

Forrest Wilson sums it all up. "Although to date only NSS and PADI offer certified cavern diving courses, we hope that the fine programs of NAUI, YMCA, NACD and others will soon follow. After all, it doesn't matter *who* does the training — only that the training is adequate and available. I know of no better way to help people learn to respect the underwater caves and have safe fun while diving in them." And that's what it's all about.

For more information on cavern diving courses, contact: NSS CDS Training Committee, 2832 Concord Drive, Decatur, Georgia 30031 or PADI Cavern Diver Program, 7212 Eudine Drive N., Jacksonville, Florida 32210. For the free cave and cavern diving safety brochure or other publications, write: NSS CDS Publications Committee, 10259 Crystal Springs Road, Jacksonville, Florida 32221.

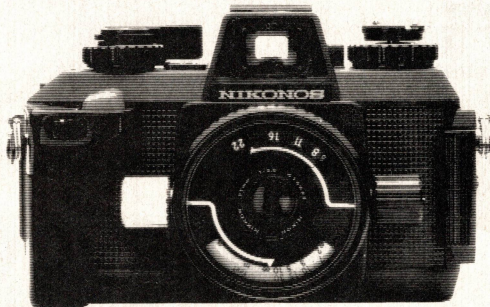
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Old timers who dive the Gulf of Mexico off Pinellas County, Florida (the Tampa-St. Petersburg area) do not brag about gorgeous scenery, living coral reefs and gin-clear water. The stories they tell are of the beauty of massive schools of fish, forming a wall of moving marine life extending as far as a diver can see. They speak of giant jewfish roaming the bottom like herds of cattle, so tame you have to push them out of your way; and of crevices jammed with grouper, their tails sticking out into open water.

Not only the fish, but all life in the Gulf, including lobster, crab and turtle seem to be exaggerated in size. Perhaps this is nature's method of compensating for the lack of transparent water and the relatively drab bottom terrain, making Gulf diving unappealing to photographers and sight-seeing divers. But Pinellas' reefs are an underwater hunter's paradise — and it is one of the few remaining areas in America where divers can still find virgin reefs and wrecks that have never before been seen by humans.

The stories of Gulf marine life were told during a discussion with a group of veteran Pinellas divers at the World of Wa-

ter, a Tampa dive shop. The shop has a dive boat for trips into the Gulf and the session was to brief me on what I might expect to find.

World of Water trips are made aboard a 46 foot Hatteras with the most deluxe accommodations of any dive boat I have encountered in Florida. The Hatteras carries only six divers in addition to its crew; but these six enjoy air conditioning, comfortable sleeping accommodations, a modern kitchen, refrigeration, and sophisticated electronic navigation gear. The key component is a Northstar Loran-C (long range navigation) which utilizes radio waves instead of compass readings. The Loran numbers are shown on a chart as lines, and boats equipped with Loran simply stay on the given number for the distance listed, then use a recording fathometer to find the exact spot. Loran is important to Pinellas divers because finding a hot reef or wreck means "diving by the numbers."

Buddy Stokes, a top rate underwater photographer, explained that unlike the Florida Keys where divers are concentrated on a relatively few popular coral reefs, Gulf reefs are the remnants of an ancient shoreline submerged by a rising ocean. These reefs consist of outcroppings, or breaks, found at various depths. The reef lines begin in about 10 feet of water and are repeated as separate breaks at different depths with the last break in 65 feet of water about 24 miles offshore. Beyond the reef lines is a sandy bottom so flat it only drops about one foot per mile all the way to the Florida Middle Grounds, a submerged coral reef lying about 85 miles out. The World of Water runs special charter trips to the Middle Grounds, but normal trips

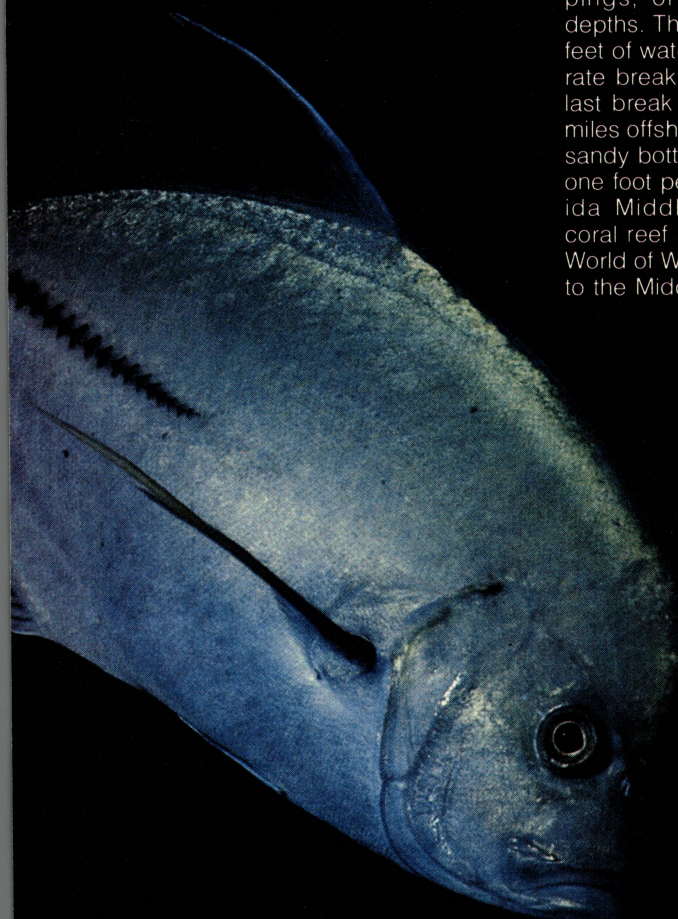
are one day runs to local reefs and wrecks.

The sand bottom between the reefs is decorated with soft corals and huge sponges but, except for shellfish such as horse conch and helmets, which are abundant in some areas, the sandy areas are usually as barren as a desert. Gulf marine life is concentrated around wrecks and reefs — and hiding places are at such a premium that even a single piece of rock or an old tire will often be swarming with fish. Buddy Stokes says he has bumped into a 500 pound jewfish trying to hide behind a two foot ledge.

Some reef breaks are less than 100 yards long and others run for miles; and some sections are merely outcroppings protruding less than a foot above the sand, while others are seven to eight feet high and are undercut with deep ledges. Obviously, it is the high breaks and deep ledges that attract the most and biggest fish.

Reef breaks can be located by using a depth recorder and cruising the selected depth. But this is a time consuming, hit-or-miss method and you can waste hours reading the bottom without finding a good break. When you are lucky and hit a hot spot, if you don't have Loran it is virtually impossible to return to it again.

Shipwrecks are even more difficult to find than a natural reef, without Loran. Over 70 wrecks have been located in the Pinellas area and more are being discovered all the time; but trying to locate one of these by running a compass course and using a depth recorder is analagous to trying to find a pair of eyeglasses dropped overboard in a harbor. Loran is important to Pinellas divers, once you have the right Loran numbers, a navigator can run directly to the location even if it is 40 miles offshore in



TAMPA BAY'S BIG FISH REEFS

more than 100 feet of water.

But obtaining the right numbers can be tricky because divers are reluctant to disclose the location of a favorite fishing spot. In fact, both divers and sport fishermen will go to great lengths to prevent a secret reef or wreck from being discovered. As one diver put it, "Everybody is running around with a 'pocketful of numbers,' but persuading a guy to tell you his good ones is about as easy as getting a woman to admit her age." As a result, almost every veteran Pinellas diver has a list of secret numbers (which are probably duplicated on other secret lists) and they play games of hide-and-seek to throw competition off their trail.

For example, divers have tried marking reefs with temporary buoys. Buddy Stokes says, "They never last through a weekend because somebody either cuts them loose or moves them." He said he has tried marking a reef by dropping a buoy one-half mile away, hoping it would throw others off but permit him to run a compass course and find the reef again. He found the buoy, but never found the reef. The buoy had been moved, perhaps several times, and the reef was lost to everyone.

The competition is so keen that old timers never dive a new wreck while other boats are around because, "somebody is sure to get nosy." Some veterans have even dropped anchor and dived a sand bottom in order to shake a following boat off their tail. If the other boat stops and drops divers overboard, they take off fast and lose it.

Not all good dive spots are hard to find, however. More than half a dozen artificial reefs have been planted in the area, most of them under the leadership of Dr. Hayward Mathews of St. Petersburg Junior College, an avid diver and spearfisherman. These reefs consist of construction rubble, old tires and sunken ships, and are marked with permanent buoys. Most charter trips arranged through dive shops in the area run to these reefs. They attract an amazing abundance of marine life, providing excellent diving and spearfishing.

My introduction to Pinellas diving was on one of the artificial reefs and if my experience is any indication of what to ex-

pect, visiting divers will not be disappointed. It was several years ago and the reef we hit was made of construction rubble. All that remained were a few scattered pieces of metal and concrete protruding above the bottom, but fish were everywhere. They came in all sizes, shapes and colors, swarming over the bottom and swirling above our heads. Schools of small fish were so dense they sometimes obscured our vision. Larger fish concentrated around the reef projections included grunts, porkfish, angels and damselfish, all jockeying for position with spear-sized grouper and snapper.

Clouds of baitfish drifted overhead and the schools occasionally burst into frantic flurries as the silvery body of an amberjack or cobia flashed among them. Now and then huge masses of migratory fish moved through the surface waters creating a constantly changing panorama. At times the space above us was darkened by thousands of Spanish mackerel. At other times schools of bonito or kingfish blotted out the sunlight as effectively as if a thundercloud had passed overhead.

My spearfishing companions were after jewfish however, and they swam away in search of their quarry leaving me to enjoy the scenery. Ironically, shortly after they disappeared five big jewfish appeared and swam toward me. One was a monster which appeared to be as wide as I am tall. I watched in fascination as the behemoths moved so close I could count the remoras clinging to their bodies. They circled a few times to look me over, then swam slowly away and vanished into the gloom.

Later, as I was hanging suspended in midwater, the fish near me suddenly vanished and I found myself surrounded by a tremendous school of barracuda. They came out of nowhere and in such numbers that their streamlined bodies formed a solid wall of fish circling me. Then, to my amazement, one of the barracuda detached itself from the school, contorted its body into an S shape, and darted at me like a streak of silver. The fish did not strike, but it only missed by inches.

I watched horrified, as more barracudas peeled off, performed the same weird contortion, then flashed toward me. Soon dozens were going through the ritualistic gyrations and zipping at me, all simultaneously. I was suffering from an acute case of nervous cudadphobia before my wandering buddies showed up and the strange fish left.

I had never seen anything like it be-

fore, but I was new to Gulf diving at the time and wasn't sure such aggressiveness was normal for 'cudas in these waters. This doubt was reinforced by my companions who greeted my story with skepticism and informed me that Gulf barracuda only bluffed, and were nothing to be concerned about. A short time later, both of these experienced Gulf

divers were driven out of the water by aggressive barracuda. They said some had actually snapped at their flippers and they showed me teeth marks to prove it. But, that was ten years ago — and I have yet to hear of another diver experiencing a similar phenomenon. The abundance of marine life on the artificial reefs makes them popular spots and some local dive shops run regular trips to these areas. But the boats equipped with Loran usually prefer to visit the natural reefs or shipwrecks that most divers cannot find. The World of Water has acquired a list of Loran numbers indicating reef and wreck locations they claim are virgin, and they are finding new ones all the time. Fish populations are so dense around some of these they fool the depth recorder, causing it to read fish instead of rocks. Most of these reefs are rarely hunted so the fish are unafraid of humans and spearfishermen can select the species and sizes they want. Even though they know the reef, divers never know what kind of marine life they may encounter because it often changes from week to week and from season to season.

Gulf diving is almost totally dependent upon the weather. Water temperatures range from below 50°F in winter to the mid-80's in summer, but there is almost always a thermocline with colder layers of water near the bottom. Temperature changes occur quickly in winter, dropping as much as 20° in three days when a cold front moves in from the north. The sea surface can also fluctuate violently, from glassy calm to seven foot seas. Visibility also varies from inches to more than 60 feet.

The people I talked to believe the best time for out-of-state divers to visit Pinellas reefs is in spring or fall. Local divers can afford to stay ashore when a winter storm front moves in and blows the Gulf into a froth, but windy days can cause problems for vacationers. Thunder storms in the summer, which pick up almost every afternoon in Florida, also create inconveniences in the Gulf. These squalls cause only temporary setbacks when diving close to shore, such as in the Keys, but when you are 30 miles out in

Author describes best spearfishing spots in Florida's west coast Pinellas County area

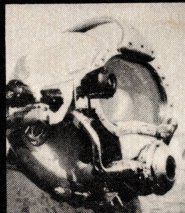
By Bill Barada

pect, visiting divers will not be disappointed. It was several years ago and the reef we hit was made of construction rubble. All that remained were a few scattered pieces of metal and concrete protruding above the bottom, but fish were everywhere. They came in all sizes, shapes and colors, swarming over the bottom and swirling above our

fore, but I was new to Gulf diving at the time and wasn't sure such aggressiveness was normal for 'cudas in these waters. This doubt was reinforced by my companions who greeted my story with skepticism and informed me that Gulf barracuda only bluffed, and were nothing to be concerned about. A short time later, both of these experienced Gulf

the Gulf there is no place to hide when thunderhead squalls whip up the sea.

The water is usually clearer in winter than in summer because plankton blooms are sparser. Pinellas divers also claim that spearfishing is better in winter because larger fish move into shallow water and are more sluggish when the water gets cold. Those who prefer to hunt



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PINELLAS REEF

open water game fish will prefer months when the jacks, cobia and kingfish migrate into the area.

Spiny lobsters are rare off Pinellas, probably because the cold winter water kills most of the young. But those you do find are big, often around ten pounds. The shovelnose, or slipper, lobsters are generally more abundant in the Gulf than in the Keys.

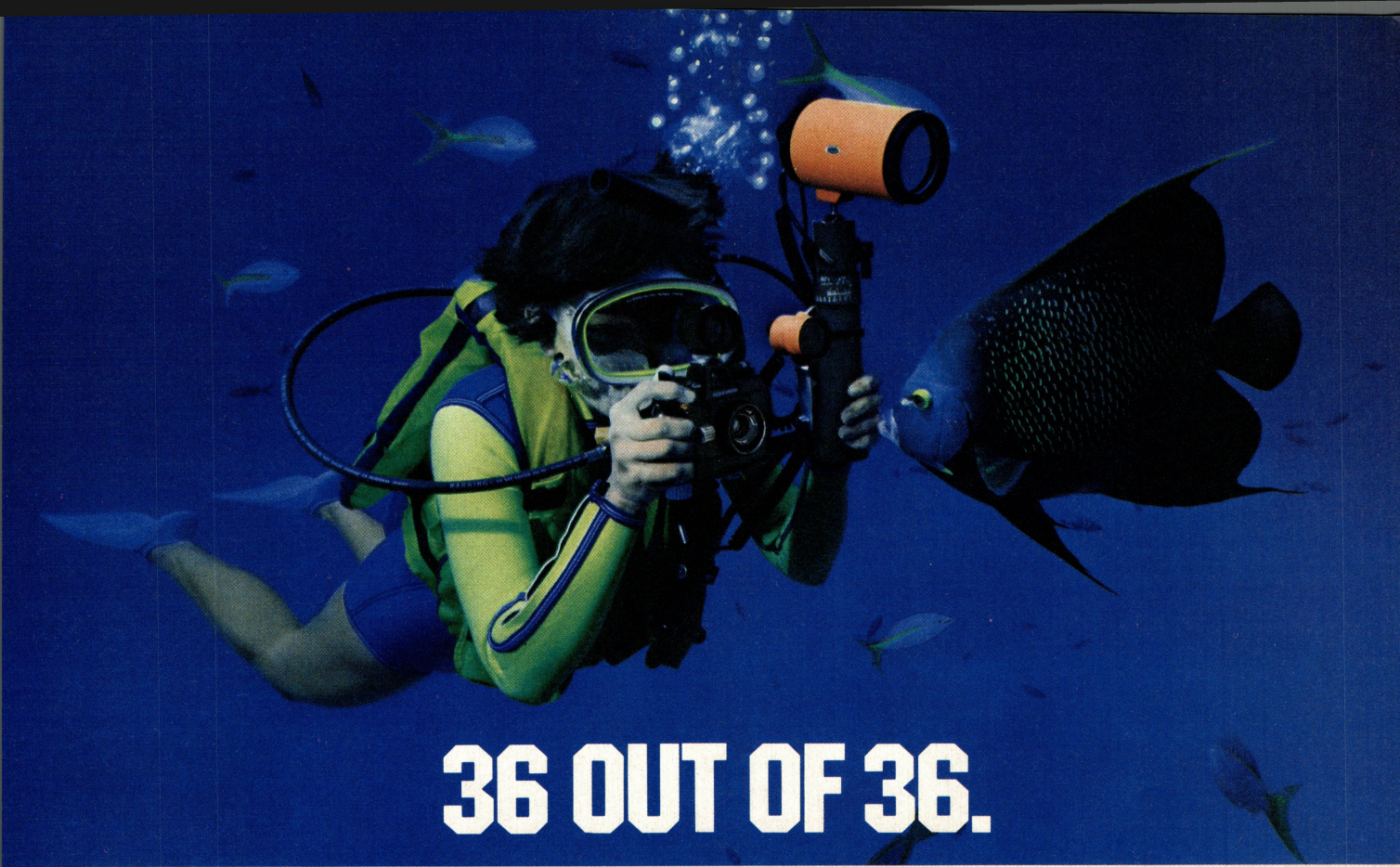
Both seashells and tropical fish are abundant on Pinellas reefs. Cowries, spiny oysters, tulips and other species are not difficult to find and the queen helmet shells found in 70 feet of water are giants. Horse conch are equally huge and are plentiful in some areas. Tropical fish collecting is becoming more and more popular and large colonies of fish can be found beneath docks, jetties and around harbor rubble as well as on the outer reefs and wrecks.

The soft corals and sponges that predominate on the flat sand bottom give way to encrustations of brilliantly colored hard corals around the rocky edges of a break. These areas and the entire face of the reef are usually swarming with tropical fish. Larger fish, turtles and lobsters are usually found hiding in ledges and crevices of deep undercuts, but not always. According to Pinellas divers, large grouper are often so numerous there are not enough hiding places to accommodate all of them. Spearfishermen often take two fish with one shot. This is not only true inside crevices and ledges, but out in the open as well. The grouper are so thick, according to some divers, that a diver can wait until two are lined up in exactly the right position before he pulls the trigger.

The high breaks and undercuts are not the only productive regions. Dennis Pupello says that one flat reef is so riddled with holes they call it the Swiss Cheese. Most of the holes are shallow and round, about two feet in diameter and, according to Pupello, at certain times of the year large grouper are so abundant the competition for hiding places is fierce — the fish crowd into the holes so thick that some of their tails stick out. He believes the grouper probably think they are hidden, like the legend of the ostrich with its head in the sand, and they hold their position even when touched and petted.

Different species seem to predominate on different reefs. On some the red grouper are the dominant species, on others black grouper are the most plentiful. Hog snapper are abundant on shallow reefs and giant red snappers are inhabitants of deeper reefs. Jewfish may be encountered anywhere but, according to World of Water divers, the most, the biggest and the most aggressive are

(Continued on Page 24)



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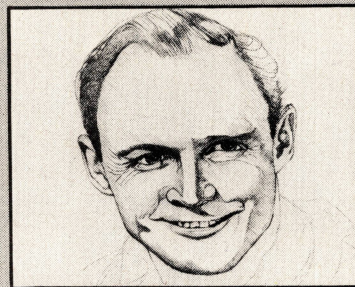
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Technifacts

BY E.R. CROSS



Last month's Technifacts covered methods a diver might use to repair damage to small boats. An understanding of the principles of small boat repair is essential if salvage is to be successful.

Small boat salvage may become necessary owing to vessel stranding or sinking. Stranding may be caused by engine failure, an anchor failing to hold, or the failure of any part of a mooring. A boat may sink after it collides with another surface craft, a dock, or a submerged object; by broaching to or being swamped by waves; or because of storm damage.

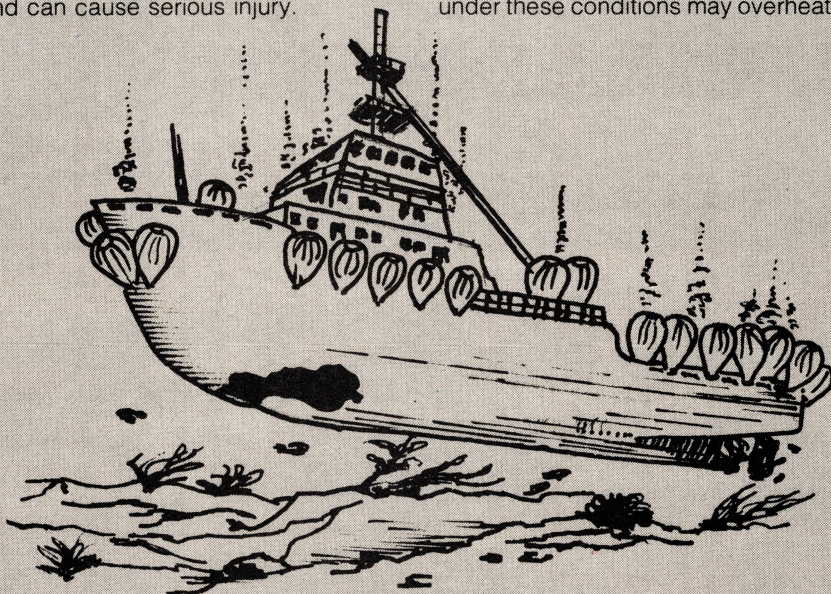
STRANDED BOAT SALVAGE

The problems of refloating a stranded or beached boat are very similar regardless of the cause. The first consideration, after all persons whose lives may be in danger have been removed, is to prevent the boat from going any further aground. This can usually be accomplished by placing one or two anchors of appropriate size as far offshore as practical, with heavy anchor ropes between the stranded vessel and the anchors. The same anchors and lines may be used later to haul the boat back into deep water. As soon as the above precautions are completed, the boat should be refloated as quickly as possible to prevent further damage to the hull, fittings and rigging.

The stress that must be put on rigging used to haul a boat off the shore makes it impractical to attach hauling lines to cleats, bitts, or other normal boat fittings. Instead, a bridle made of heavy rope, capable of taking the stress of any available method of pulling, should be rigged completely around the vessel from bow to stern and back to the bow (if the boat is to be pulled off bow first). Smaller lines will be required to secure this towing bridle in place at or near deck level. These lines may be fastened to cleats, bitts and other deck fittings.

As soon as possible the towing bridle should be rigged and all preparations made for making a pull at the time of the next high tide (if in a tidal area). Blocks and tackles can be rigged to the towing lines to increase the pulling power of the

towing vessel or winches. Crews should remain as clear of the rigging as possible while heaving on these lines. A line that breaks while under stress flies through the air with tremendous force and can cause serious injury.



If the boat is grounded in an area having no tidal differences, or if it grounded at high tide, other steps may have to be taken to free it. Prior to the pull divers may be able to clear away rocks or other obstructions between the vessel and deep water. While this is in progress, any weighty objects that can be removed should be placed in the dive boat or in other boats at the scene. If necessary, to save the more valuable boat, throw the weighty objects overboard. If they are of sufficient value they can be recovered later. Any water in the boat's tanks can be pumped overboard. Fuel in tanks can be pumped into drums on the dive boat, or into drums which are then sealed and thrown overboard for later recovery — they will float. Objects that can be removed include food stores, anchors, chains, mooring lines, spare equipment, personal belongings and almost anything else that is movable. Sometimes even a couple of inches additional buoyancy will make the difference in floating a stranded boat. Any small assistance that can be given should not be overlooked.

If the engine and propellers of the stranded boat can be used, backing the engine at half or two-thirds speed may help scour a channel in the bottom and help free the vessel. Using full power under these conditions may overheat the

shaft bearings and also cause cavitation around the propeller with loss of pull.

Sallying, or rocking a boat back and forth from side to side, may also help break the hull loose and start it toward deeper water. Sallying can be accomplished by having personnel run or walk quickly back and forth from one side of the boat to the other.

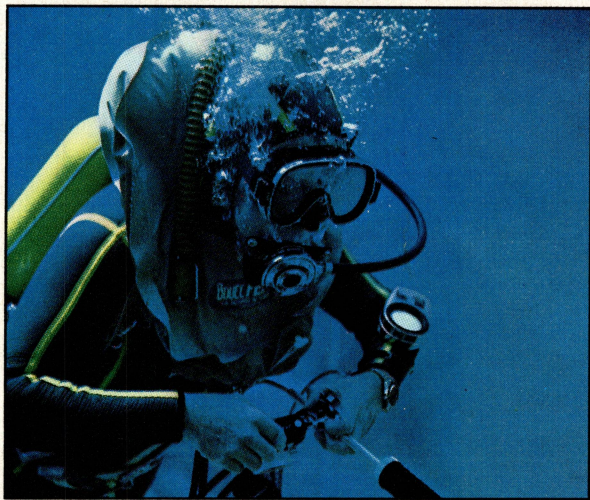
Another method that sometimes works is to have a boat pass back and forth just offshore to produce waves that, as they pass under the stranded vessel, help break it loose and free it for towing into deeper water.

During these operations stress is maintained on the hauling lines and rigging leading to the anchors and to the towing boat or boats. When a boat is refloated with hauling lines, it usually comes free in a hurry. Vessels assisting in the salvage must be alert for this and keep clear to avoid being overrun by the salvaged boat.

Sailboats almost always draw less water when heeled over on their sides. To

(Continued on Page 40)

Why the Rolex Sea Dweller never gets the bends.



Divers are not the only ones to experience decompression sickness, or 'the bends'. Watches, as well as people, can suffer in much the same way.

When diving to depths in excess of 300 feet a diver must rely on a breathing mixture containing a high percentage of helium.

T. Walker Lloyd, one of the world's leading scuba and saturation divers, takes up the story:

"Helium molecules are so small that no substance known to man can contain or inhibit this gas under pressure—even the Rolex Oyster case! When decompressing, this gas is unable to escape quickly enough from an ordinary watch case.

"I've actually known watches to explode as a result."

The Rolex Sea Dweller, however, is fitted with a patented gas escape valve. As the Oceanographic Consultant for Rolex,

T. Walker Lloyd has kept in touch with the development of this unique feature since its conception.

"The operation of the valve is a masterpiece of simplicity. It is a spring-loaded one-way valve. When pressure within the watch becomes greater than ambient pressure, the valve simply opens allowing the trapped gas to equalise.

"In effect, this means that the watch decompresses with the diver."

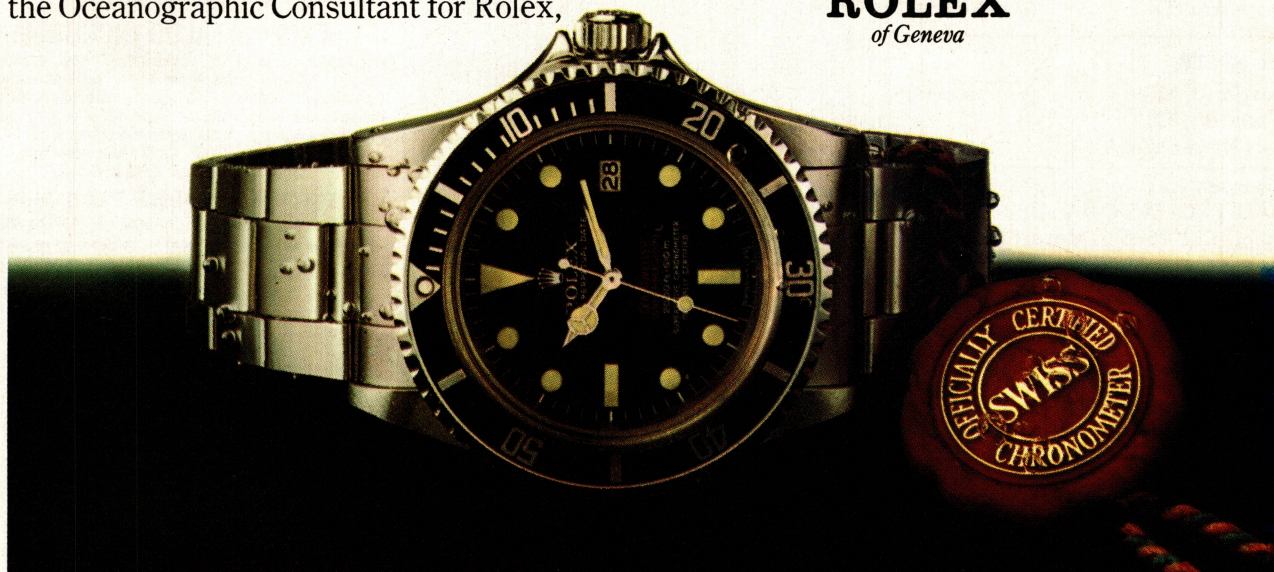
T. Walker Lloyd has worked as diving supervisor for Dr. George Bass, when excavating a 4th-century Roman wreck in the Aegean Sea.

He was also a member of the first team to saturate on 95% nitrogen and 5% oxygen at a depth of 100 feet. During the experiment, the team made working dives of up to 265 feet on compressed air. So he understands better than most the importance of highly accurate and reliable equipment.

The Rolex Sea Dweller is certainly a remarkable watch. And yet apart from the gas escape valve and a specially strengthened case, it is made in exactly the same way as any other Rolex Oyster.

Which means that if T. Walker Lloyd ever gets tired of underwater exploration, his watch will be equally at home in the frozen Arctic, the heat of the Sahara Desert, or at the top of Mount Everest.

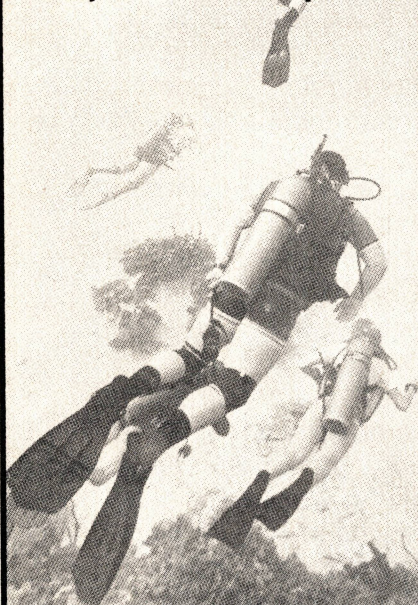

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PINELLAS REEF

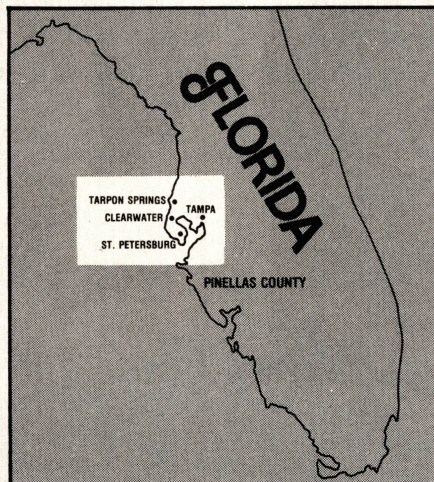
(Continued from Page 20)

found on the wreck of the *Mexican Pride*.

The *Pride* lies 37 miles offshore in 120 feet of water and it attracts the largest colonies of the biggest fish these divers have ever seen, anywhere. The water column above the wreck is virtually alive with fish. Huge schools of mackerel, jacks, bonito, kings and barracuda patrol the waters near the surface. Huge amberjack are so tame they follow a diver like a pack of curious dogs and a few bolder ones will sometimes try to bump or nuzzle you.

The wreck itself is swarming with fish, including large grouper and giant red snapper. But the most eye-popping sight is the jewfish. Hundreds can be seen at one time moving across the bottom like herds of cattle. Buddy Stokes says these giant bass are far more belligerent than any others he has encountered. He says, "They will actually square off and challenge us. Sometimes we have to bang them over the heads with our spearguns to make them move out of the way." World of Water's Charles Kristick told me, "They will steal a speared grouper right off the shaft."

Bill Yancey, a member of the St. Pete Underwater Club, did not retrieve a speared grouper quickly enough. The jewfish that came after it grabbed his leg



and swallowed it up to the thigh. He made the fish let go by beating it over the head with his speargun, but the battle left scars that Yancey will carry the rest of his life. He was not wearing a wetsuit so his bare leg was exposed to the fish's tiny teeth and the skin was peeled off as neatly as if it had been removed with coarse sandpaper.

These are only a few of the highlights of diving off Pinellas County, but as we stated in the beginning, the primary attraction is for underwater hunting, not

(Continued on Page 122)

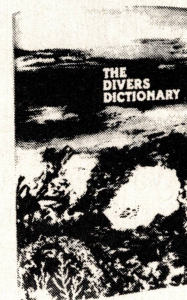
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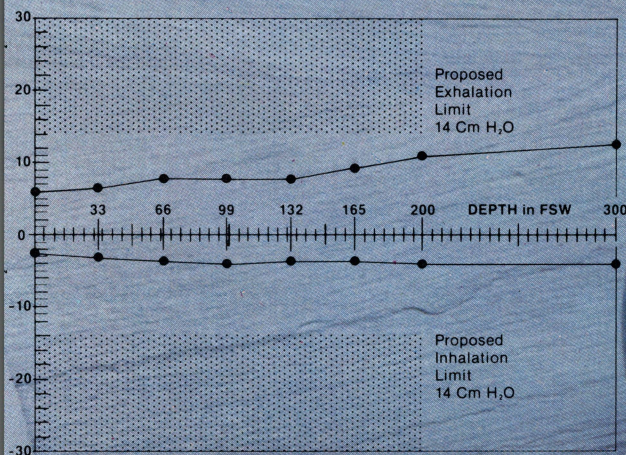
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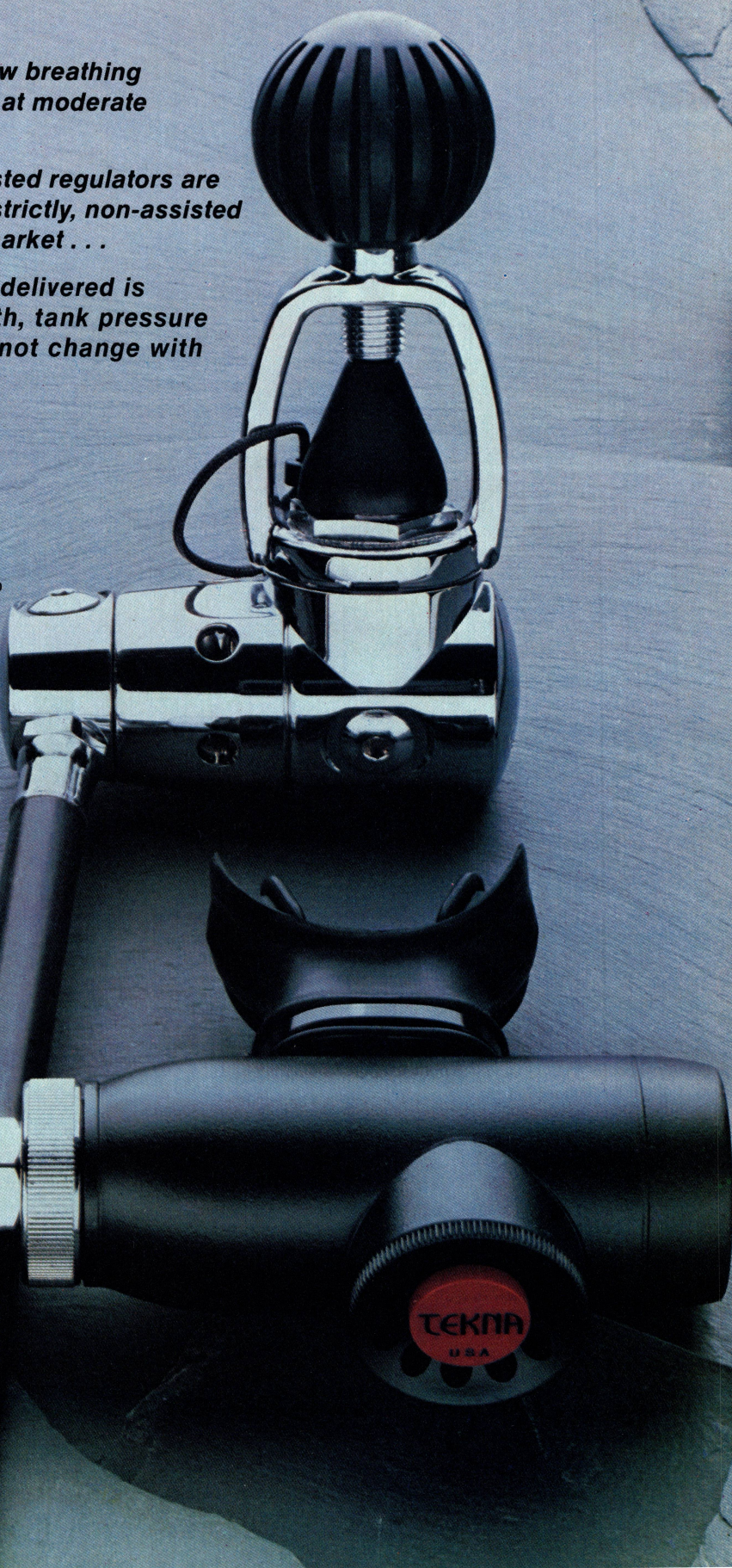
U.S. Navy Experimental Diving Unit

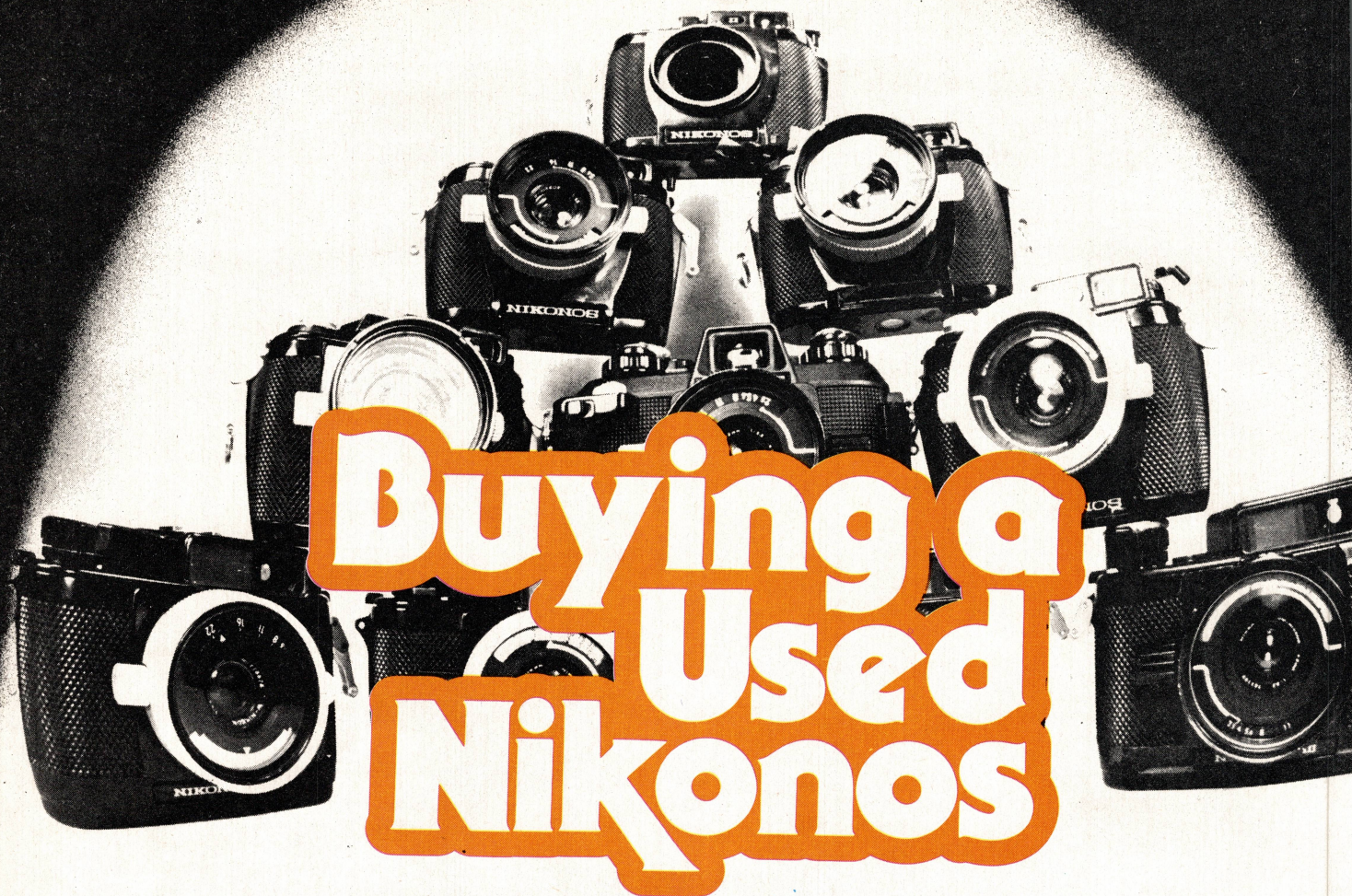
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*Camera experts provide helpful hints on
shopping for a used U/W camera* *Text and Photography by Jim and Cathy Church*

You can save money by buying used underwater photography equipment. However, while bargains certainly do exist, so do expensive mistakes. The following article is intended to help you evaluate a used Nikonos I, II, III or IV-A. It contains 36 checkpoints which will take you through three levels of interest: Points 1 to 15 are for your preliminary examination of the camera's exterior. Then, if the camera looks good, points 16 to 29 provide a more detailed examination of the camera body and lens. Points 30 to 36 are your final checkpoints before you write your check.

1. The overall appearance is important. A Nikonos that looks good probably has had good care and/or infrequent use. Beware of a Nikonos with a beat-up appearance.

2. Examine the O-rings and rubber gaskets that seal viewfinder ports, film counter windows and the glass port of the lens assembly. If cracked, the rubber is deteriorating and needs replacement. Also, look for discoloration caused by moisture penetrating the viewfinder

system. A flooded viewfinder, however, won't flood the inner camera body.

3. Check the lens accessory threads at the front edge of the metal lens assembly. If dented, you won't be able to use screw-in accessories such as filters and threaded close-up lenses.

4. Check the glass port at the front of the lens assembly for scratches or other abrasions in the surface of the glass.

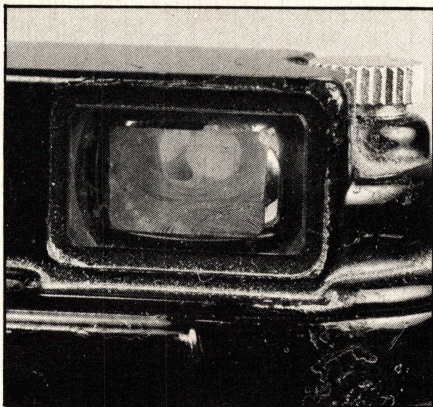
5. Check the sideplay of the lens control knobs. These should have only a slight amount of play. If too loose, the tiny screws (you must remove the lens from the camera body to see them) that hold the knobs to the control shafts must be loosened to adjust the fit of the knobs on the shafts and retightened. If there are oxide deposits on these, only a trained camera repairperson may be able to loosen (or replace) them for an adjustment.

6. Try to wiggle the viewfinder shoe with your fingers. If it is loose or is obviously bent, the tiny threaded holes in the camera body are probably damaged. Ask the owner to tighten the

screws that hold the shoe in place. If he can't because threads are stripped, the camera needs a delicate repair.

7. Rotate the shutter speed dial and feel for the click stops. The absence of these means that: (a) the spring-loaded ball that regulates them has corroded in place; (b) the ball is jammed by dirt or other debris; (c) or, the spring has lost its tension. Thus, the shutter speed setting could slip out of adjustment while you are using the camera underwater.

8. Rest the camera on a table top and gently squeeze the shutter release lever inward (with a IV-A, depress the release button gently). This slow, squeezing motion should trigger the shutter. If you must jerk or punch the release to trigger the shutter, an adjustment must be made. With a I or II, there is a screw in the camera body, just behind the film advance lever. We suggest using nail polish remover to soften the glue that locks this screw in place, and then turning it in (to the right) so the shutter release can be squeezed in closer to the camera body. Turn the screw one-quarter



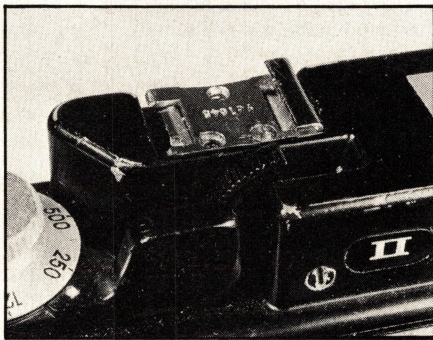
The result of moisture entering the viewfinder.

ter turn at a time until the shutter releases properly. Note: As a final check that this adjustment is needed, place a piece of paper over the head of the adjustment screw and squeeze the shutter release lever inward. If the paper is gripped between the release lever and screwhead, the screw should be turned in. With a III or IV-A, the shutter release adjustment is internal and should be made by a repairperson.

9. Trigger the shutter several times and observe the film frame counter. It should advance even if there is no film in the camera.

10. Check the operation of the shutter release safety lock.

11. Raise and rotate the rewind crank, then lower it. Some of the exterior parts of older Nikonos' are made of weak plastic that cracks or breaks easily. And, with some cameras, it is difficult to lower the rewind crank without grasping the rewind fork (or the bottom of a film cassette) inside the camera. With a III,



Bent viewfinder shoe.

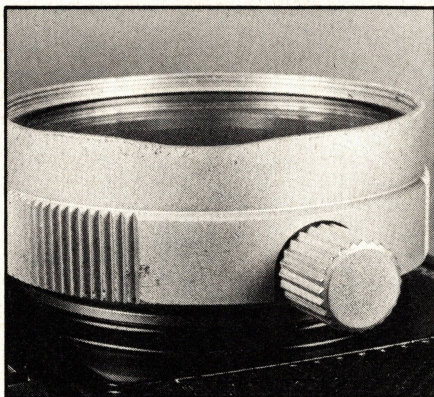
examine the locking collar that fits around the rewind shaft and is flush with the top of the camera body. If it unscrews and rides upward, the camera can flood. It can be screwed back down with a fine screwdriver tip (pressed against the grooves at the top of the collar) and glued in place with a drop of nail polish. With a IV-A, also make sure the film speed dial (which encircles the rewind shaft knob) works freely. This must be lifted before turning.

12. Remove the flash socket plug (a coin works better than a screwdriver).

Use a small flashlight to look inside for worn or broken threads. We've seen broken threads deep inside the sockets of several new III cameras, but are mainly concerned with the first 3/16 inch. If the threads are visibly damaged or worn, a threaded insert may have to be installed. (Write to Gates U/W Products, Box 7477, San Diego, CA 92107 for information and prices.) Also, examine the flash contacts. With a I or II, the center (blade-like) contact may be corroded or mangled. With a III or IV-A, look for contacts that have been bent into a circular pattern by a connector that rotated inside the socket. Bending these contacts back is tricky — they often snap off.

13. If you are buying a strobe, or already have one, attach the sync cord to the camera and test flash the strobe by triggering the camera shutter.

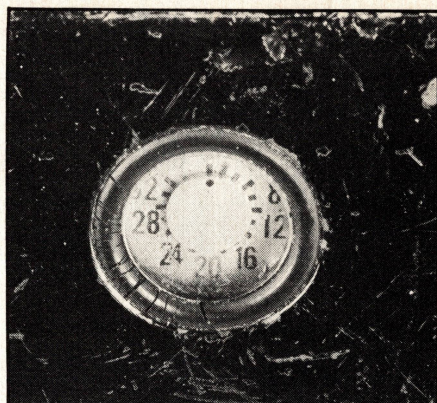
14. Although this procedure won't test a IV-A automatic exposure control for accuracy, it will verify that the meter is functioning. Aim the empty camera at



Dented lens accessory threads.

a dark area, so the blinking LED display in the viewfinder warns of underexposure, and trigger the shutter. You should hear two separate, distinct sounds — the sound of the shutter opening, and the sound of the shutter closing a short time later. Then, aim the camera at a bright area, such as a light bulb, so the blinking LED warns of overexposure. When you trigger the shutter, the opening and closing sounds should be so close together that they sound as one. Remember, the meter doesn't turn on until the film frame counter has been advanced to the #1 position. If the meter doesn't function, check the battery compartment for oxides or corrosion on the contacts, and if clean, retest with a new battery.

15. With a IV-A, shake the camera body with its left side facing down. If the open-close lock falls out of place and dangles below the camera, you will need to tape it in position while underwater. Otherwise, you could accidentally open the camera back while underwater. With a I, II or III, examine the lifting levers and the surfaces they press against. Expect some looseness in the levers, but they

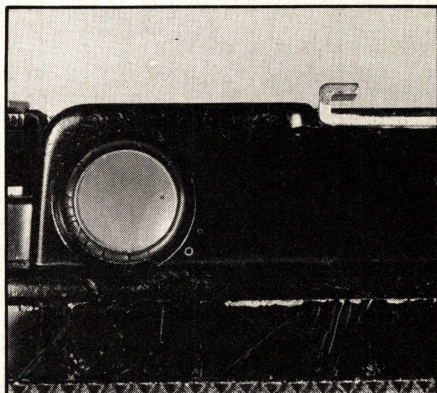


Cracked O-ring around film frame counter.

should operate smoothly and not slip out of place when you use them to open the camera body.

16. Remove the lens from the camera body, and the inner camera body (I, II or III) from the outer casing. The lens should turn off, and the inner body lift out, smoothly. If the O-rings are dry, they may bind against their sealing surfaces. Apply a thin coating of silicone grease to the main O-rings of the lens assembly and inner camera body, or to the surfaces on the outer casing that these O-rings seat against. A small amount of grease, applied with a fingertip, is all that is needed! You should be able to install or remove both the lens and inner camera body without any mechanical hang-ups or problems. With a IV-A, check the operation of the camera back latch, and check the hinge of the back for looseness.

17. Two guide pins, located at the rear of the lens assembly, fit into two slots at the front of the camera casing and pre-



Cracked O-ring around rear viewfinder port.

vent the lens from rotating. Make sure that the guide pins haven't been worn down, or the slots enlarged, by rough handling. Obvious worn areas in the casing or inner camera body can indicate that ill-fitting extension tubes have been forced into place.

18. Check the screwheads on the inner body carefully. Look for damage caused by improperly fitting screwdrivers. Marred screwheads are a clue that someone other than a trained repairper-

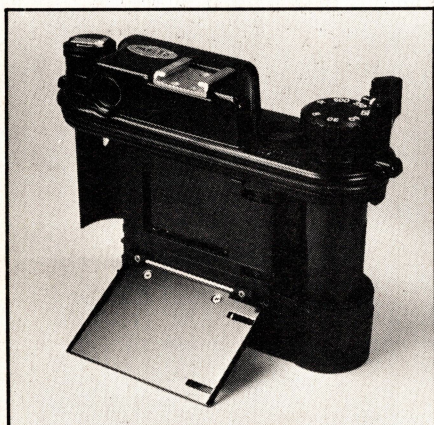


The shutter should release smoothly.

son, (or Cathy) has tinkered with the camera.

19. Look for corrosion and oxides that indicate moisture has been inside the camera body. Corrosion often indicates that the body has been partially or completely flooded. Corrosion on shutter curtains could affect shutter speed accuracy.

20. Check the pressure plate. With a



An undamaged pressure plate.

Nikonos I, the plate is non-movable and shouldn't be a problem. The pressure plate of the II is hinged at the top. And if the inner body has been jammed into the outer casing with the pressure plate flipped up over the edge of the casing, it may be bent outward. Press against the two metal bands (to simulate the pressure of the casing) with your fingertips. If the pressure plate doesn't lie flat, it needs repair. With a III or IV-A, the pressure plate is hinged from the bottom. See that the plate closes flat against the film plane, and that the latch locks it firmly in place.

21. Visually inspect the operation of the shutter curtains as follows: With a Nikonos I, place a piece of white paper under the pressure plate, hold the camera under a lamp (or bright sunlight), and look at the front shutter curtain. With a II or III, open the pressure plate and aim the inner camera body down at a piece of

brightly illuminated white paper (or toward a bright window or light). Look at the rear shutter curtain as you trigger the shutter. You will see a flash of brightness as the curtains uncover and recover the film frame area. This brightness will diminish as you trigger the shutter at each consecutively faster shutter speed setting. Note: With a II, it may be more comfortable to hold the camera body upside down and let the pressure plate hang down out of the way.

22. Use the sound and feel of the moving shutter curtains to confirm the visual test (#20, above). Listen to the sound of the moving shutter curtains and feel their vibrations through your fingertips as you trigger the shutter at each consecutive speed from 1/30 to 1/500. At each faster speed, the sound gets shorter, the pitch changes, and you can feel the difference. With a Nikonos IV-A, which has only one manually controlled shutter speed (1/90 at M), the visual, sound and feel test only confirms that the shutter does open and close.

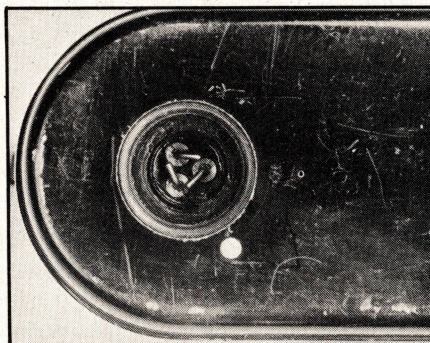
23. Testing for synchronization means to verify that the shutter curtains completely uncover the film for the exposure



A bent rewind lever.

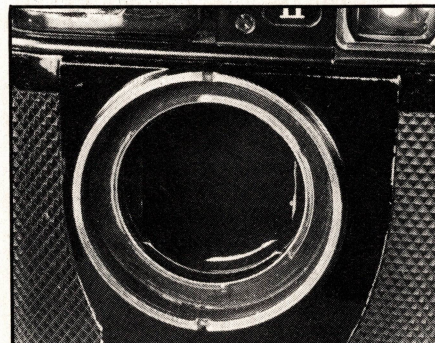
much white paper when changing from 1/125 to 1/250 seconds, and half as much again when changing from 1/250 to 1/500 seconds. Note: If your strobe is exceptionally bright, wear sunglasses when testing.

With the Nikonos IV-A, test at the M (mechanical, 1/90 second) speed. Because the shutter curtains have a different design, they will synchronize with the strobe at this higher speed. Remove the lens, open the back, hold the pressure plate up with a thumb and aim the camera and strobe at a bright area. When you trigger the shutter, the entire area at the film plane should be open and bright as you look through the back of the camera.



Bent flash contacts.

at the exact moment the camera triggers the strobe flash. With a I, II or III, place a piece of white paper beneath the film pressure plate. This paper simulates the film. And with a III, make sure that the paper doesn't cover the film advance sprocket teeth, or it will jam in the mechanism. With a I, II or III, place the inner camera body back inside the outer casing, attach a strobe, but don't replace the lens. Set the shutter speed dial for 1/60 second (the fastest shutter speed setting that will synchronize with a strobe on a Nikonos I, II or III), and aim the strobe at the front shutter curtain. When you trigger the strobe with the camera shutter release, you will see all of the white paper within the film frame. This means that the shutter and strobe are synchronized. At 1/125 second, however, you will see that one of the shutter curtains has partially recovered part of the white paper — the shutter and strobe aren't supposed to be synchronized at this and higher speeds. If the shutter speeds are reasonably accurate, you should see about half as



Enlarged guide pin slots.

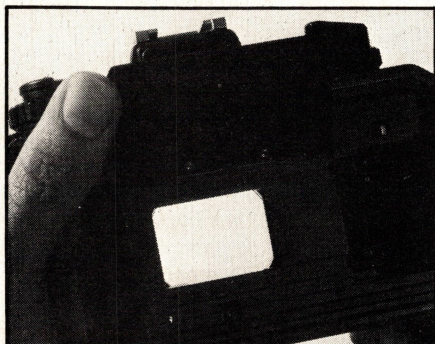
24. The film frame spacing (the blank spaces between the pictures on film) may be uneven, especially with older I and II cameras that have seen a lot of use. This is why color slides may be miss-cut and mismounted by automatic machines. If you are unable to shoot a test roll of film to check the spacing, at least do the following: (a) Load with a cassette of inexpensive film — outdated junk film would be fine. (b) Set the shutter speed to B and remove the lens. (c) Trigger the shutter, but keep the shutter release pressed in so the shutter curtains stay open. (d) Draw a vertical line at the extreme left and right sides of the film frame, directly onto the film, with a sharp pencil or ballpoint pen. (e) Release the shutter release lever, and repeat this process until you're out of film. (f) Open the camera, release the pressure plate (or slip the film from beneath the stationary pressure plate of a Nikonos I), and pull the film from the take-up spool. (g) Stretch the film out and examine the vertical lines. These lines will show the ap-



Synchronization test for Nikonos I, II or III.

proximate spacing between each frame of exposed film. If the spacing is uneven, you may have to have your film processed uncut, and then cut and mount your own slides. If the spacing overlaps, the camera definitely needs repair.

25. With the I, II and III, use a small flashlight to examine the three blade-like contacts at the inside of the flash socket. If these are bent or mangled, they may not make proper contact and the camera may fail to trigger a strobe. If you see corrosion at the tiny screwheads near these contacts, the flash socket may have leaked a small amount of water, or the camera may have been flooded. Corrosion could lead to an electrical short



Nikonos IV-A synchronization test.

between hidden parts within the socket and this could lead to flash failures.

26. Remove the lens assembly from the camera body and look at the iris diaphragm blades as you operate the aperture control knob. As you turn from f22 to f2.5 (or the lowest f number of the particular lens), the aperture (opening made by the blades) should get wider. Also, the depth of field indicators should move toward the focused distance (on the distance scale) to indicate the reduced depth of field at the wider aperture. And when you turn the aperture control back from f2.5 to f22, the aperture should get smaller and the depth of field indicators should move to show the greater depth of field at the smaller aperture. If the aperture and depth of field indicators don't change when you turn the control knob, the lens needs repair.

27. Examine the surface of the rear lens element for possible scratches, smears of grease or fingerprints etched in the coating. If the surface is dirty, ask the owner to clean the lens — then, ex-

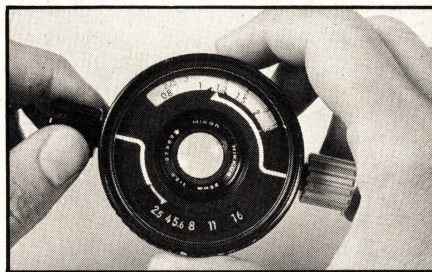
amine it again. Set the aperture for the widest opening and look through the lens, toward a bright area. There shouldn't be any particles or fogging between the glass elements.

28. To check the focus control, set it for minimum distance and lay the lens face down on a table top. Look at the retaining ring of the rear element as you change focus from minimum distance to infinity: You will see the rear element actually move upward slightly. And when you turn the control knob back from infinity to minimum distance, you should see the retaining ring and glass element move downward slightly. If you have trouble seeing this movement, shine a flashlight at the element, and look at it from the side as you move the focus control. If there is no movement, the lens needs repair.

29. The bayonet lock at the rear of the lens assembly (which has the metal flanges that lock the lens to the inner camera body) should work smoothly. Hold the lens assembly with one hand and grasp the two flanges with the fingers of the other hand. You should be able to pull the spring-loaded bayonet lock about one-eighth inch back from the



Testing for film frame spacing.



Checking the aperture control.

main lens assembly. If you see corrosion on the screws and guide pins (as you look between the bayonet lock and main lens assembly), or if the movement feels rough, the spring-loaded screws may be corroded or dirty. Ask the owner to remove a couple of the screws (the four screws at the rear of the bayonet lock) so you can examine them. If these are corroded, think twice about buying the camera.

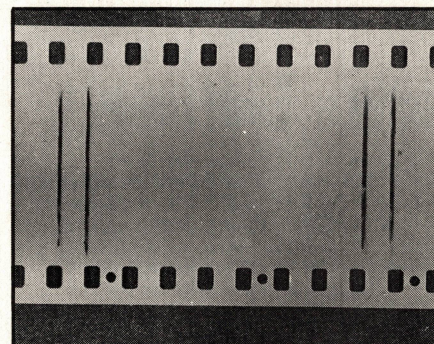
Assuming the camera has passed all of the previous tests to your satisfaction, it's time to actually expose a test roll and

THIRTY-SIX CHECKPOINTS FOR BUYING A USED NIKONOS

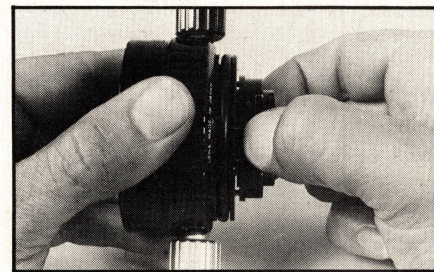
EXTERIOR		20. Pressure plate
1. Overall appearance		21. Shutter curtains — visual
2. O-rings & gaskets		22. Curtains — sound & feel
3. Lens accessory threads		23. Synchronization test
4. Glass lens port		24. Film frame spacing
5. Lens control knobs		25. Inside flash contacts
6. Viewfinder shoe		
7. Shutter speed dial		LENS ASSEMBLY
8. Shutter release		26. Aperture control
9. Film frame counter		27. Lens elements
10. Shutter release lock		28. Focus control
11. Rewind crank		29. Bayonet lock
12. Flash socket		
13. Strobe test flash		FILM TEST
14. IV-A meter		30. IV-A meter accuracy
15. O-C lock & lifters		31. Verify shutter speeds
		32. 35mm lens sharpness test
		33. Mechanical operations
INNER CAMERA BODY		
16. Opening & closing		OTHER CHECKPOINTS
17. Guide pins & slots		34. Watertightness test
18. Screwheads		35. Testing accessories
19. Corrosion & oxides		36. Receipt & warranty

have it processed. While you may do some of your test shots underwater, some of the following test exposures are best done in a pool or topside, where you have more control.

30. To test the IV-A metering system topside, use Kodachrome 25 because



Pencil marks indicate spacing between frames.



Bayonet lock should work smoothly.

its limited exposure latitude (the amount by which you can miss the correct exposure and still get an acceptable picture) will make exposure errors obvious if the meter isn't working properly. Be careful, however, to evaluate exposures of average scenes. An overly-bright scene, such as a beach scene with lots of sand and bright sky, will fool any meter and can lead to underexposed pictures. Conversely, metering off overly-dark subjects, such as black, can fool any meter and lead to overexposed pictures.

31. To double check shutter speed ac-

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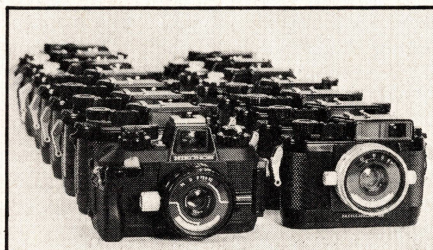
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30 SKIN DIVER JULY 1981

USED NIKONOS

curacy with a I, II or III, shoot at the different aperture/shutter speed combinations that give equal exposure values (such as f5.6 @ 1/500 and f22 @ 1/30). You shouldn't be able to see any differences in these exposures. Depth of field and sharpness may vary, however, so judge by the exposure alone. Also, when examining the processed film, look for a



thin, dark bar at the top edge of the slides (or negatives) — it indicates the shutter curtain which recovers the film is bouncing. If so, the camera needs a repair.

32. To test a 35mm lens for sharpness and focus, tape a newspaper to an outdoor fence or wall. Classified ad pages are great because they have a variety of type sizes. Mount the camera on a tripod, measure exactly three feet from the film plane to the paper, and use a carpenter's level to check that the camera and paper are perfectly aligned. If you don't have an exposure meter, bracket around f16 and 1/30 second with ASA 25 in bright sunlight. This is your test slide for sharpness — when projected, you see the sharpness in the center, edges and corners. An exposure at f4 at 1/500 (or wider aperture if lighting allows) gives an approximate check on focus. Because of the limited depth of field at f4 and wider apertures, you should see a significant loss of sharpness if the focus control is out of adjustment. But even if the focus is correct, you may see some slight loss of sharpness at the wider apertures. The 28mm and 15mm lenses must be tested underwater.

33. Shooting film is the ultimate test of mechanical operation. The film should advance smoothly, the counter should be accurate, the shutter should trigger easily, and you should have no problems while rewinding. And having pictures, of course, is psychologically satisfying: You know the camera works!

34. If you found any corrosion inside the camera body, test the camera for watertightness. If you can have it tested in a pressure chamber, or can try the camera on a dive, great. If not, tie a cord to the camera and lower it into the deep end of a swimming pool for at least 15 minutes. Dry the outside thoroughly before opening. If you find one drop of water inside, forget that camera.



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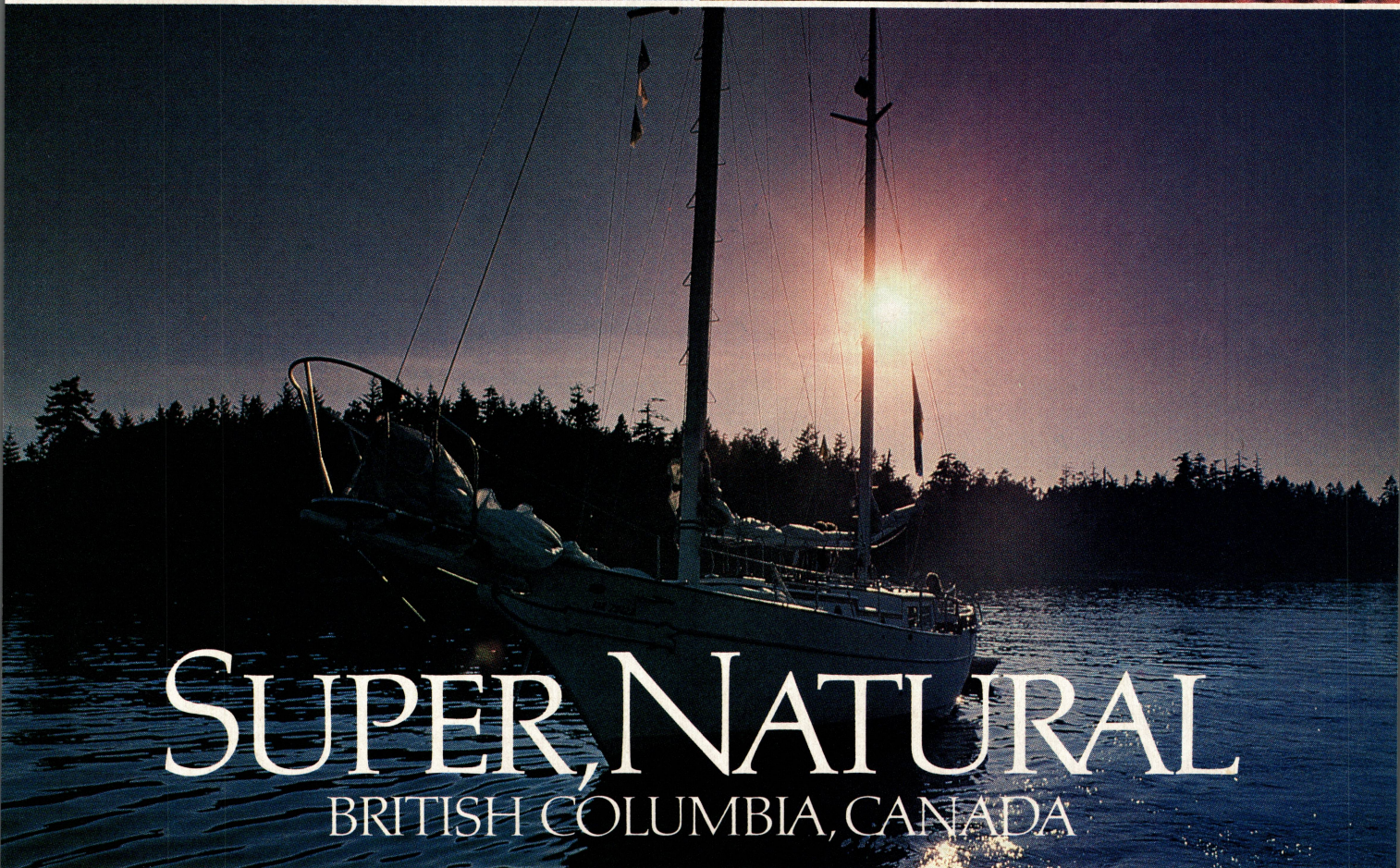
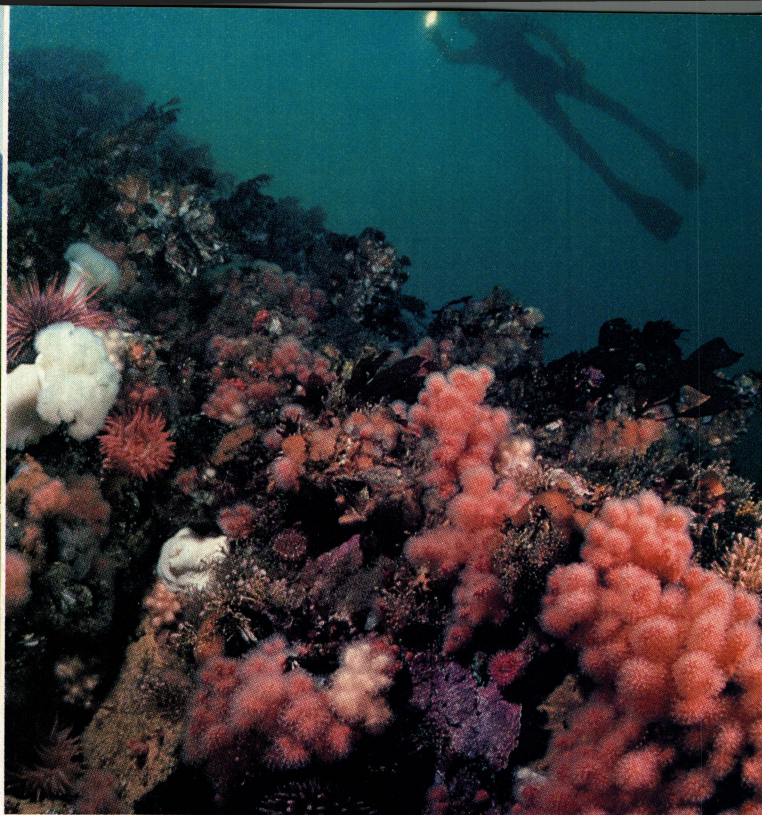
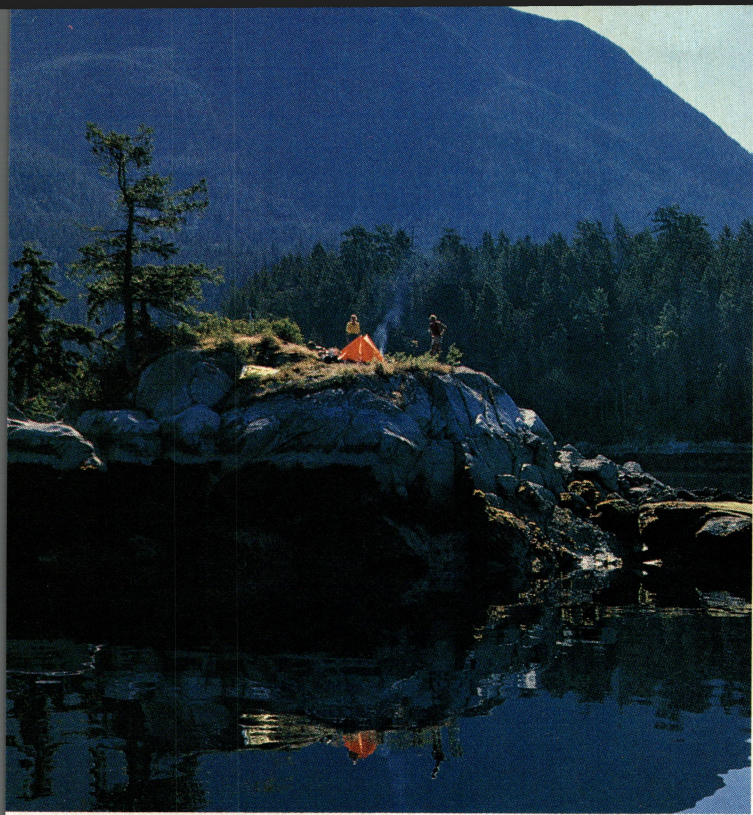
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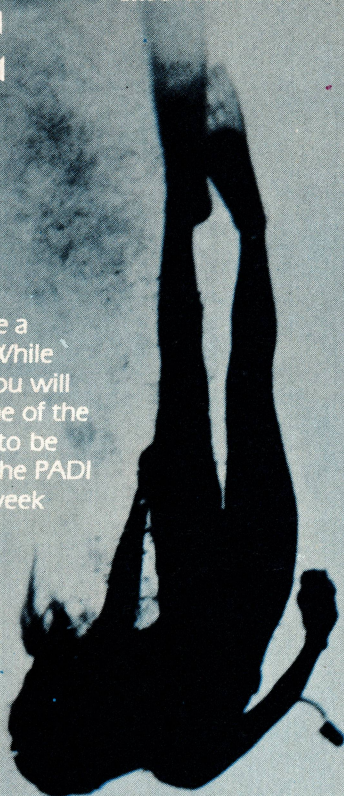


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USED NIKONOS

35. If you already have some accessories, such as extension tubes, close-up lenses, or bars and brackets, make sure they fit the camera. And if you intend to purchase any accessories, ask the salesperson at the dive shop to demonstrate how these can be attached to the camera you intend to buy. You can't build a system if the camera won't accept the accessories you will need in the future.

36. If you are purchasing the camera at a dive shop, make sure that any warranties be noted on the sales slip. And if purchasing from a private party, ask for a bill of sale (date, names and addresses of the buyer and seller, serial numbers of equipment, price, terms of payment and signatures) which can be handwritten and should contain any statement of warranty. Remember: If you purchase on an "as is" basis, what you see is what you get! ➤

IN-DEPTH DIVE SEMINARS

Multi-day in-depth dive seminars are being conducted from Avalon on Santa Catalina Island this fall. Catalina Island is off the coast of Southern California and the seminars are being presented by Jon Hardy of Argo Diving Services. Hardy is well known in the dive community as a business and dive consultant.

During the five days of the seminar participants will make at least ten dives. Each dive is supported with lecture/discussion, AV materials, and printed materials on the practical aspects of that activity.

Complete detailed information is available from Jon Hardy, Argo Diving Services, P.O. Box 1201, Avalon, CA 90704; (213) 510-2208. ➤

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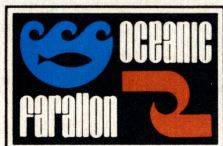
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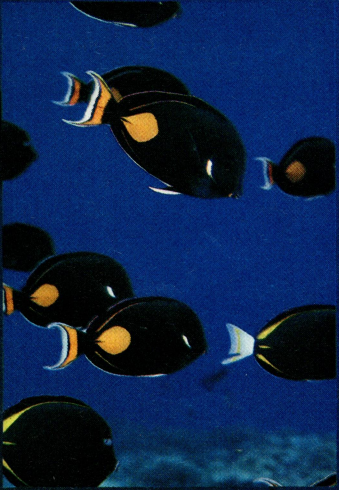
*eagle's claw



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IN FLIGHT SCUBA



Juvenile and adult surgeons.



A school of banded humbugs.

Gray reef sharks in the deep blue waters outside Manihi atoll.



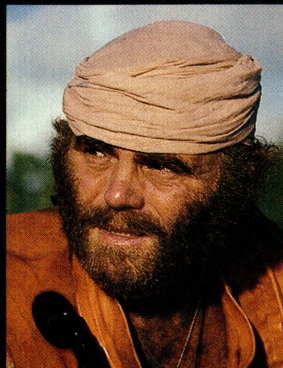
During tidal exchanges, all water entering or leaving Manihi lagoon flows through the pass (in the background of the picture).



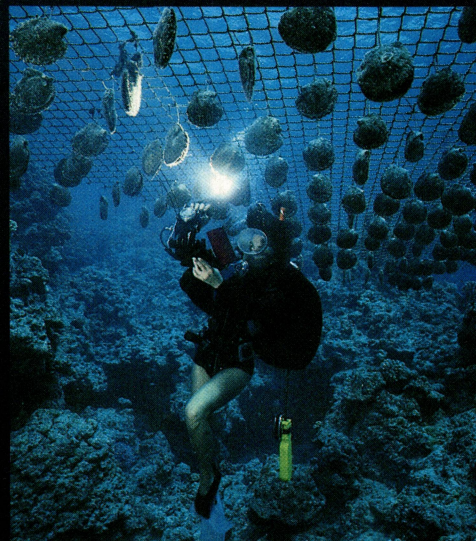
Bungalows are right on the water at the Kaina Village resort on Manihi.



A cruising manta ray outside the pass.



Jean Michel Roussel



Michele gets a close-up at the pearl farm.

Author Describes Soaring Experience— Drifting The Manihi Pass

Text and Photography
By Howard Hall

The current became increasingly strong as we drifted toward the pass. Jean Michel Roussel was in the lead with Michele Binder and I following 30 feet behind. Jean Michel frantically motioned us to our left, positioning us in the center of the flow. The depth was becoming alarmingly shallow and the current had increased well beyond the use of fins. Soon we were helplessly rushing toward the entrance to the Manihi Pass.

It was one of the few times underwater that I regretted taking my camera. I envied Jean Michel the use of both hands for the turbulent water ahead. Michele probably felt the same way. Her macro system was going to do her little good on this dive. Even if she had the strength to hold onto the bottom long enough to take a photograph, the current could literally tear her camera system apart. I felt slightly uneasy for Michele. In this current there was nothing I could do for her if there was a problem. And, the entrance to the pass was close at hand.

My uneasiness stemmed from inexperience. I had never drifted through a current pass before, let alone one as rapid as Manihi's. And although Jean Michel assured us that the dive was safe as well as wonderfully exciting, new dive experiences are nearly always accompanied by rushes of adrenalin. Just looking at the Manihi pass convinced me that this was to be such a dive.

The Manihi atoll is approximately ten miles in diameter and this body of water is entirely surrounded by reef with the exception of the one pass. During tidal exchanges, all the water entering or leaving the lagoon must run through a gap which is only 50 yards wide, one-quarter mile long, and 70 feet deep. At the entrance there is a coral shelf which rises gradually to within ten feet of the surface. Water leaving the atoll rushes over this shelf like Grand Canyon rapids and from the surface, that's exactly what the entrance to the pass looks like: river rapids. Smooth water rushes toward the entrance, tapering to form the

tongue of the rapids. Then as the water passes over the shallow coral, it becomes turbulent and boils up forming two foot high standing waves and white caps. At times water velocity in the pass approaches 12 knots, faster than the speed at which most sportfishing boats cruise.

Our velocity accelerated rapidly as we neared the entrance to the pass. Ahead I could see the bridge of coral with its deep V-shaped cut filled with blue light. Jean Michel rushed over the bridge of coral like a bug being swept down a drain and vanished into the V. Because the rushing water doesn't go through the coral, but runs over and around it, Michele and I discovered that obstacles were easy to avoid. We too were swept with the water around obstacles, then hurled over the coral bridge and into the V.

Suddenly, we dropped through the V cut in the bridge and into the pass itself. We were tumbling down toward the bottom of the pass with the flow of water. It was difficult to stay close together since we were often pulled in opposite directions. But, the turbulence was not nearly as rough as I had expected. We were bounced around, changing our positions, but it was far from an unpleasant sensation.

Once in the pass itself, we could relax and watch as the undersea panorama flew by. Water visibility was excellent and from near the bottom we could see both sides of the pass at one time. These walls rose vertically all the way to the surface with large undercuts and caves where schools of fish took refuge from the flow. I imagined that the sensation of drifting over the ocean floor like this must not be unlike what the astronauts experience as they hang motionless in space, watching the continents fly by. It's an incredible feeling.

Since such large volumes of water rush together to pass through the current cut, this is an area of concentrated food sources. For this reason, it is one of the best places to observe marine wildlife, especially large predators. Drifting through the pass we not only saw sharks, but we saw at least four species of them. Groups of blacktips moved slowly back and forth through the current, then rapidly bolted as we approached. There were over a dozen reef whitetip sharks holding their positions against the current waiting for some morsel of food to come flowing by. Michele accidentally disturbed a large nurse shark which alternately rushed up one wall of the pass then turned and rushed up the other before hurrying upstream and out of sight. We saw large eagle rays, several 100 pound plus Murray wrasse, many large tuna and one giant seabass as we drifted along. This was one of the highest con-

centrations of large marine animals I have ever seen.

Our velocity rapidly slowed as we approached the end of the pass where the lagoon water spills into the Pacific abyss. The journey had been so much fun that I was disappointed when it was over. But as Jean Michel, Michele and I gathered on top of a large table coral and Jean Michel pointed out into the distance, I saw something equally as exciting. Our dive was far from over.

Manihi is a coral atoll 330 miles northeast of Tahiti in French Polynesia. It has a population of 160 (nearly half of which are children) and one small luxurious hotel called the Kaina Village. This is where we stayed and where Jean Michel works. The accommodations at Kaina Village are delightful. Our room consisted of a cottage built out over the water and connected to the beach by a short dock. In the mornings and evenings we sat on the porch to watch sunrises and sunsets while coralfish and an occasional baby shark swam below our feet.

We had flown to Tahiti from L.A. aboard a UTA French Airlines DC10. UTA offers nonstop flights Thursday through Sunday from Los Angeles on either DC10's or 747's. Sea Safaris (our travel agent) has only recently started organizing dive expeditions to Manihi. This company had made the arrangements for our trip and had prepared us well for everything except the food. The quality of the meals served at Kaina Village can only be understated. Exceptional French cuisine was served with copious amounts of good wine. You can forget about losing weight no matter how much diving you do.

The owner of the hotel is Koko Chaze. An avid diver, he set about preparing complete dive facilities once the hotel was built. All the necessary equipment is now available and, fortunately for U.S. customers, it is all American made. Diving is done from two very large skiffs which can reach the pass from the hotel in five minutes. These are large enough so that even with camera equipment, diving is easy.

Koko Chaze is a wonderful host. He attends meals (which are served in a large open air dining room) with his guests and is always available in the bar or the boutique for questions or conversation. Unfortunately, Koko was unable to dive with Michele and I on this trip because he had a broken leg, an injury he sustained when he fell into the shark pit in Manihi's Tahitian village. It seems that the Tahitians catch nurse sharks for sport with a lasso. The captured sharks are placed in the shark pit for the children. American children have their dogs and cats, Tahitian children have their sharks. Nurse sharks are generally docile animals and the children are rarely

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IN FLIGHT SCUBA

bitten. Rarely.

Koko broke his leg returning from a celebration in the Tahitian village late one night. The celebration had not been very exciting and no alcohol had been served. But, in the darkness, despite the lack of wine, Koko stumbled into the shark pit. He promises to dive with us the next time we come to Manihi.

Jean Michel Roussel came to Manihi from the Maldive Islands. There he be-



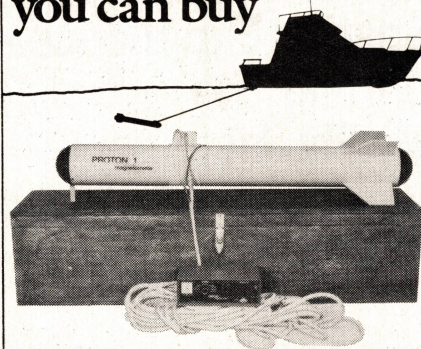
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came fascinated by sharks. During his years in the Maldives he learned to hand feed the local reef sharks and even made a film about his experiences, which was shown on French television. When he heard that a crazy American shark diver was coming to Manihi, he began looking forward to showing off his animals. At the end of our current pass dive, as Jean Michel pointed out into the distance, he looked at my face for my reaction to the scene before us.

In the distance at a depth of 120 feet was a massive school of gray reef sharks. I had seen great numbers of grays in the Coral Sea and even schooling grays in the Red Sea, but I had never seen a school like this. There were between 50 and 80 sharks in a large circular group. I stared in awe as the massive school milled about before me and a large manta ray slowly passed through them.

If you have never seen a shark in the water before and plan a trip to Manihi you had better get used to the idea. Not only will you see sharks during your stay on Manihi, but you will see them on every dive! The risk of attack is negligible (unless you intend to spearfish, of course). The problem is not the sharks getting too close as much as your trying to get close enough to get a picture. As I stood on the table coral with Jean Michel, this was the problem facing me: How could I get close enough to get a photo of the entire school without disturbing it? I decided a silhouette was the best idea. I descended and began moving out below the school. This method only partially worked since as I passed beneath them many of the sharks moved away and the school thinned significantly. Still, I managed to get nearly 20 in a single frame.

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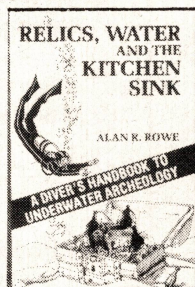
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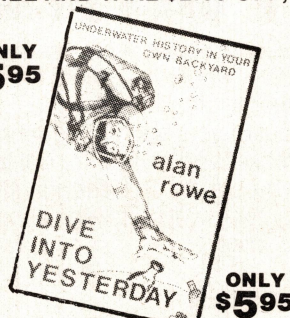
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IN FLIGHT SCUBA

As I swam out to shoot my silhouette Jean Michel surfaced to get a bag from the skiff. He had decided to give the crazy American shark diver a special show. He descended with a bag of fish from which he planned to attempt feeding the Tahitian sharks.

Jean Michel had attempted hand feeding the Tahitian sharks before and found them more aggressive than the Maldivian animals. The night before our dive, he showed us the film, made in the Maldives, of his reef shark feeding. I thought I noticed a difference between the Maldivian sharks and the Tahitian animals. Although both animals are known as gray reef sharks, I suspected that the Tahitian sharks were *C. amblyrhynchos* while the Maldivian sharks were *C. wheeleri*. The only noticeable difference is a narrow white border on the dorsal fin of the latter variety. I also suspected that the Tahitian variety is far more dangerous when baited.

By the time I returned from shooting my silhouette photo, Jean Michel had already gathered several interested sharks. He was careful not to offer too much bait and was quick to back off when the sharks became too aggressive. Nevertheless, I was able to get several good close-ups of the sharks and was more than glad to have had that opportunity.



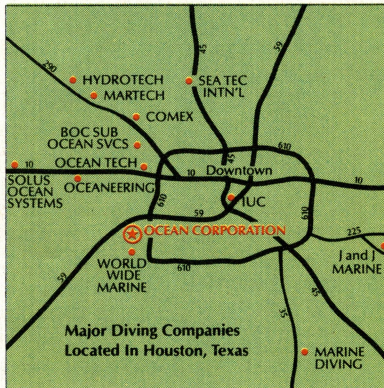
During our seven day stay in Manihi, we made many dives through and around the pass. All the best diving at Manihi seems to be centered around this area. Outside the pass there are magnificent drop-offs, large marine animals including sharks, schooling game fish and an occasional manta ray. Inside the atoll, adjacent to the pass, are beautiful coral formations and uncountable varieties of reef fishes. In addition, there is a black pearl farm located within swimming distance of the pass. French Polynesia is the only place in the world where high quality

But the best part of diving in Manihi is within the pass itself — drifting through, effortlessly, the scenery rushing by, watching the beautiful marine wildlife gliding upstream, with a sensation of flight, like a leaf drifting in the wind. ➤

Why Houston?

BECAUSE

The Ocean Corporation is located in Houston and more commercial divers are hired in Houston than in any other place in the world. Twelve diving companies are located in Houston including three of the four largest in the U.S. Many others are located in the nearby New Orleans area. The demand for divers is so great in Houston that large locally based diving companies like Ocean Systems, Hydrotech Systems, Martech International and Sea Tech International have hired many of our students for part-time work while they were attending school. Over 90% of our recent graduates went to work for these and other local diving companies when they completed our program. Houston is the place where the action is...the commercial diving, offshore construction and oil industry capital of the world.



BECAUSE

The Ocean Corporation is a commercial diving company, not just a school. Our facilities, equipment and training aids are the best, and our diving systems are as up-to-date as possible... because much of the equipment is used by our diving operations division to perform actual diving contracts in the field. Ocean Corporation has successfully completed many underwater jobs for various industrial clients over the years... including specialized underwater inspections, maintenance and repair work. For example, we did the world's first commercial underwater repair job in a nuclear power plant. And most of our divers have been graduates of our own school.

BECAUSE

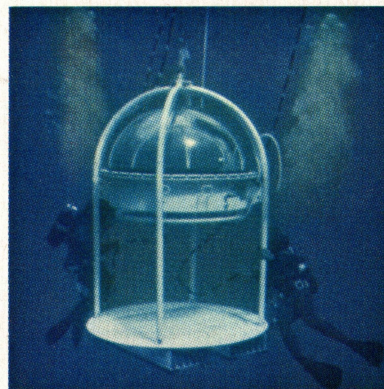
The Ocean Corporation is a convenient and exciting place to go to school. Houston is one of the fastest-growing and most dynamic cities anywhere. It is a city of expansion, energy and youth (the average resident's age is in the mid-20's). Houston offers every conceivable kind of entertainment, from sports events, ultra-modern discos and open-air theater to rough-house local rodeos, chili cook-offs and the new Texas-size country-western dance clubs. Reasonably priced adult and singles apartments are readily available within walking distance of the school, and fast-food to luxury restaurants are nearby. The semi-tropical climate is wonderful, the sport diving is great and the folks are friendly.



BECAUSE

The Ocean Corporation management and instructor staff have long-term experience in the international offshore oilfield diving business. Retired ex-military divers and sport scuba divers don't run the school...commercial divers do. For example, the President of The Ocean Corporation, Larry

Cushman, was Vice President and Europe/Africa Area Manager for Ocean Systems, Inc. for three years...with responsibility for all North Sea diving and underwater construction operations. He also worked six years as a manager for Oceaneering International, Inc., another of the world's largest commercial diving contractors. Ocean Corporation managers and instructors know today's diving business...first-hand, from recent experience.



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TECHNIFACTS

(Continued from Page 22)

take advantage of this, grounded sailboats can be heeled over on one side or the other by shifting weights or by having the boom rigged out on one side and having weights, such as people standing, on or near the end of the boom.

As soon as the stranded boat is afloat in water deep enough to be safe, make a complete underwater inspection to determine the extent of damage. Temporary repairs should then be made, as outlined in last month's Technifacts, and the boat taken to the nearest dock for permanent repairs.

SUNKEN BOAT SALVAGE

There are two generally used methods of refloating a small boat. It may be lifted bodily with a crane or floated to the surface by the use of pontoons. A third method, rarely used in small boat salvage, is to patch the damaged areas and then pump the water from the boat. Regardless of the method used, the diving and salvage boat must be securely moored over, or very nearly over, the submerged boat. Generally it is advisable to use at least a four point moor; i.e., the salvage boat is secured with at least four anchors and proper sized lines to

hold the vessel directly over the boat to be salvaged.

Before actually starting lifting operations, the diver should inspect the sunken vessel to determine the extent of damage and make any repairs possible. These will be required to keep the boat afloat after it has been lifted to the surface. See Technifacts for June, 1981, for repair techniques.

When a crane is to be used, lifting ropes and slings must be placed so the weight of the boat is evenly distributed. Lifting slings near the stern can be passed under the hull just forward of the shaft and stern tube bearings in such a way that the ropes cannot slip in either direction. The bow lifting lines can be placed just aft of the flare of the bow. When both bow and stern lifting lines are in place, they can be tied together by the use of additional smaller ropes to prevent slipping.

Cleats and bitts found on small boats are not considered strong enough to lift the boat. However, they may be used to secure lines to keep the lifting slings from slipping in a forward or aft direction.

It is far better to have more lines holding the lifting slings in place than not enough. A shift in a sling during the lift could be disastrous.

When the rigging is completed, the crane barge is moored over the sunken boat. The lifting hook is lowered into the water and the bridles attached to the

hook. A slight strain can then be taken by the crane and a final check made by the diver. If all is ready and the signal for raising the boat is given (and when the diver is clear) the boat is raised slowly toward the surface. *A diver should never, under any circumstances, be under anything that is being lifted toward the surface.*

As soon as the upper part of the main deck, or first watertight deck, is at the water's edge the lift is stopped and the hull pumped out. *Never attempt to lift a boat clear of the water while the hull is still filled with water.* Even though the crane and lifting bridle may be strong enough for such a lift, the hull of the boat would probably not be and would come apart as a result of the tremendous weight of the trapped water. Pump the water from the hull while the upper part is at the water's edge. The boat will then float gradually higher and, when empty, can be towed to repair facilities.

Several types of pontoons may be used to lift a sunken boat. They include large steel pontoons, collapsible pontoons and oil drums of various sizes. Only the latter two types are usually used in salvage of small boats. Lifting devices were discussed in the September, 1980 Technifacts and again in March, 1981.

Two methods of lifting with pontoons are used. The first involves using the tide as an aid. Large steel pontoons may be used. These are secured to the boat by the shortest possible lifting ropes or



That can't be Jack...

***I didn't even think
he knew how to swim!***

***Looks like he knows
more than we thought...***

chains at the lowest point of the tide. Enough pontoons are used to float the boat when the tide floods.

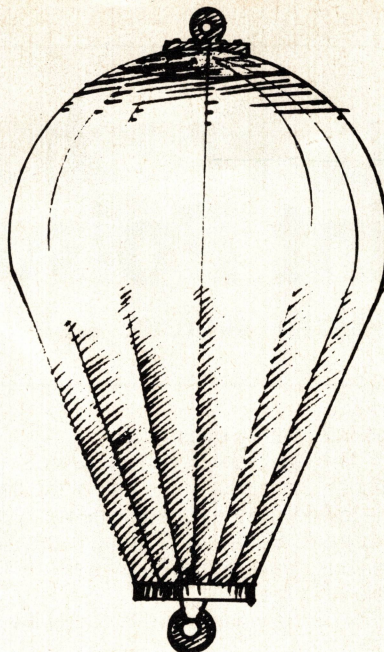
As the tide floods (rises) the boat is lifted off the bottom and boat and pontoons are slowly towed into shallow water. During the next ebb tide, when the water is again at the least depth, the lines to the pontoons are again shortened until they are tight. With the next rise in tide the boat is again refloated and towed into even shallower water. Eventually the decks of the boat will be awash at low tide and the hull can be pumped dry. Then when the tide again floods, the boat is afloat and can be towed to a yard for permanent repair.

Tidal lifts may be preferred for large boats that would be difficult to control with other lifting methods. Also, boats in deep water might be salvaged this way.

Obviously this method of lifting a small boat can only be used in waters having tidal differences of several feet. In freshwater areas a different method must be used.

The second method of raising a sunken boat is by sinking the pontoons down to the hull where they are made fast to fittings or parts of the hull strong enough to resist the pull of several hundred pounds. Enough floats are lashed or otherwise secured around or in the hull to float the boat. Air is then injected into the floats until the boat rises to the surface.

Places to secure the flotation devices



include cleats, winches, masts (if present), through hawse pipes, to ropes rove around the hull, and possibly through scupper openings. When securing the lifting rope for a given pontoon, know the maximum lift the flotation device can exert and choose an object on the hull that can withstand such a pull. Some pontoons, if of the collapsible types, may be rigged for lifting inside the hull or cabins.

Divers can fill the flotation devices with air (lift bags or drums) until the boat is nearly ready to float. Each float bag or drum should be completely filled until the boat is nearly ready to float off the bottom. Then one or two additional floats can be filled with air causing the boat to surface. The closer the floats are to being completely filled, the less run-away effect the flotation operation will encounter as it rises toward the surface. These floats must have adequate escape routes for expanding air or they may burst.

Usually, when a boat is floated to the surface with lifting devices, the hull is not completely above the water. The boat must still be towed into shallow water until it is aground. It can then be re-rigged and a second lift made to get the deck above water so the hull can be pumped dry. Or a semi-floating boat can be towed to an area where it can be lifted enough to be pumped free of water.

Before attempting to salvage a sunken boat on speculation, it is important to make a complete, accurate, and objective inspection of it. A boat that has been underwater for a number of years might not be worth the time, effort and expense of salvage.

Next month's Technifacts will discuss the salvage of cars, trucks, cargoes and airplanes. In September, questions and comments regarding prior Technifacts will be presented. ➤

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Shucks, Freshwater 'Taint Poison!

BY JIM CHESTER SKETCHES BY BRIAN CORN

Bright ocean-diver types who live in Montana have been known to conjure up fantastic tales of the rewards of Montana diving in hopes of enticing their coastal friends inland. Usually, these plays fail miserably, but persistent divers-in-Montana-exile keep trying.

The latest story appeared in a recent dive magazine. Its author claimed to have dreamt that the bottom of a pond on his Montana ranch was covered with gold — tossed there by Crow Indians. The pond was on Poison Creek, and the writer thought perhaps his ocean buddies should come to Montana to “check it out.”

When I read his words, I just about dropped my weightbelt! “My God,” I thought, “he’s found *the* Poison Creek, the one with the gold!”

Since I think I just detected the sound of 300,000 ears coming to rigid attention, I suppose I should tell you the rest of the story. Hmm . . . how to begin? Well, why not let you read the letter I sent him?

“Dear Exiled:

“As a Montana diver, I found your difficulties in enticing your California friends to the Big Sky of interest. I don’t know if what I have to say will help that problem. After all, ocean divers don’t really appreciate the finer things in life. As you shall soon realize, however, you are going to have all the dive ‘partners’ you want anyhow.

“Let me begin by saying, yes, emphatically yes, the pond on Poison Creek has Crow Indian gold in it, and lots of it! How do I know? Read on!

“The story begins at the bedside of my dying, great grandfather, God rest his soul. The place: Bear Pass, Montana. The year: 1951. I distinctly remember the scene — Grandpop lying there, ten gallon hat on head and the outline of his cowboy boots poking through the covers. Being a cowpoke, he sure didn’t want to die with his boots off. So, whenever Gramps got to thinkin’ his time had come he’d pull those ol’ boots on and hop into bed. Mom used to yell at him something fierce for getting cow, shall we say pies, on the sheets, but that’s another story.

“Grandpop lay there more dead than alive, but he recognized me through

clouded, watery eyes.

“‘Jim boy,’ he began in a croaking whisper, ‘I’m about at the end of the trail; time to ride into the sunset; time to say, so long pard. Before I go though, boy, I’d like you to have something. Fetch me the Bible off’n the shelf.’

“The Bible wasn’t hard to find, we only



had two books in the house. I grabbed the black leather volume and tearfully carried it to Grandpa’s side. For a second his eyes widened, and the old fire was there. ‘Not that one boy, the other one!’ With that, he slumped down into the bed again.

“Being only seven, it took me many seconds to read the words on the other book, but I finally got it: *Twenty Thousand Leagues Under The Sea* by Jules Verne. Yup, Gramps was a strange, ol’ cuss!

“He took the book, and with trembling hands, pulled a yellowed and crumbling paper from it. As he started to hand it to me, a shadow crossed his brow, he twitched and died. The document fell from his hands onto the bed. I broke into tears; big, round tears. They fell everywhere — down my cheeks, on Gramps, to the floor. One big drop fell onto the paper. The ancient ink sprang to life and slid off the page.

“It was several years before I could

read well enough to decipher the document’s faded scrawl, but at least I could see it was signed by John Colter.

“Now, you and I know all about John Colter. In case some of your ocean diving friends should read this letter, however, let me digress and enlighten them on this Montana mountain man.

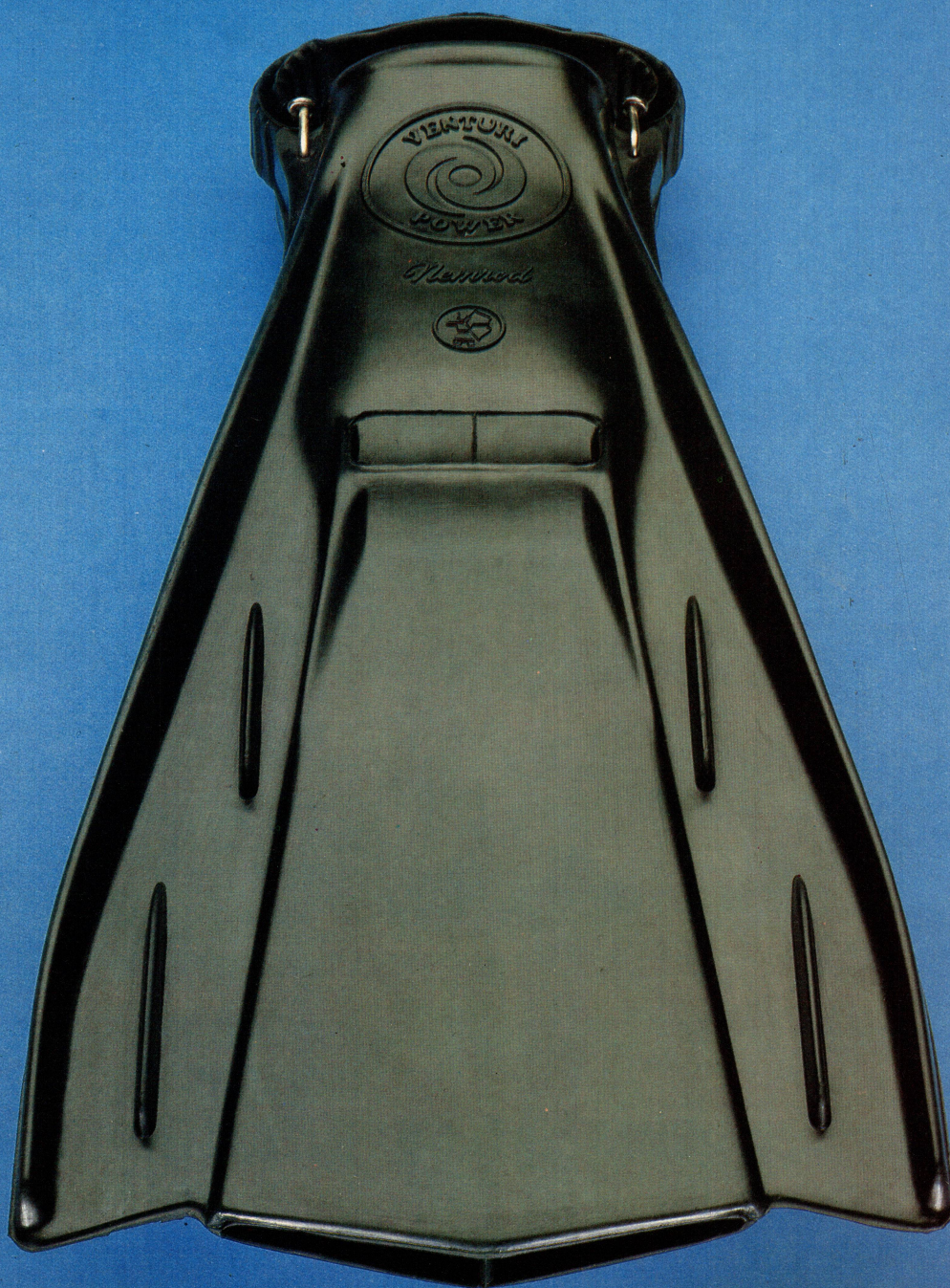
“Colter joined the Lewis and Clark Expedition in 1803. In 1807-1808, alone and on foot, he became the first white man to explore Yellowstone Park (Colter’s Hell). Significant yes, but not as important to us as his contribution to diving!

“According to the rare classic, *Mountain Men and Montana River Diving* by F. Aqueous, Colter was one of the pioneer divers in the U.S., having perfected the technique called ‘reeding,’ which we now know as snorkeling. Colter happened upon his discovery in a rather unusual manner. Seems he invoked the ire of some early Montana residents, namely, the Indians. They weren’t too pleased with his presence in their hunting grounds, so they offered him a choice: stand and be killed; or take off your clothes, run like hell, then get killed. Colter didn’t have any hangups about dying with his boots off, so he ran. He did all right, running probably the first four minute mile ever. He outraced the Indians, only to be confronted by the Jefferson River. There, he got a brilliant idea. Why not hide from the Indians under the water? Cutting a hollow reed, he slipped under the surface, and settled down to wait, breathing through the reed. Now, that was the first dive done in Montana and probably one of the first anywhere. The Indians were persistent, and they wandered around the bank for hours. Colter, meanwhile, was having a fine time. He had discovered Montana river diving with its crystal clear waters and swarming trout. He couldn’t believe his eyes. It was amazing. It was great diving! Well, the Indians finally tired and left. Colter surfaced and went on his way — sans clothing.

“That afternoon in 1806 dramatically changed his life. He became a reeding nut and dipped beneath the waters whenever the opportunity presented itself. That was often because there is lots

(Continued on Page 126)

VENTURI POWER



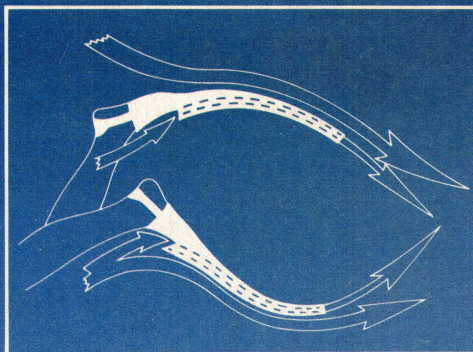
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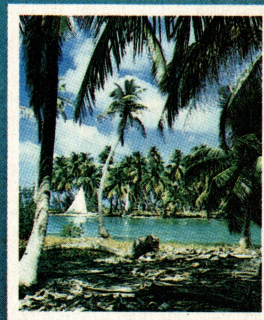
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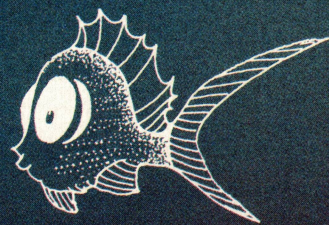
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Australia

HERON ISLAND • GREAT BARRIER REEF • CORAL SEA



photo/ Carl Roessler

Australia is synonymous with fabulous diving and fantastic adventures. Yet, to most American divers it is only a word, a legendary place far across the sea. They have heard about the great diving there, or read about it in National Geographic, or seen something of it on television, but it is still more myth than reality. To most divers, Australia has remained as distant and elusive as the craters on the moon.

But times are changing and the fantasy world of Australia is moving closer to diving reality. Modern, convenient jet travel and the emergence of Australian resort scuba facilities has placed this Land of Oz within reach of the traveling diver. Australia has finally surfaced as the newest and most exciting mecca for vacationing scuba adventurers. Why travel so far and spend so much for a diving vacation? Because Australia offers a special kind of high voltage scuba adventure that divers cannot find in the Caribbean or other nearby oceans. Australia ranks as one of the top three world class diving areas, filled with incredibly exotic marine life and big fish action.

Before rushing off on a trip to Australia, it might be helpful to know a little bit about its geography. Australia is often described as "the land down-under" because it is located below the equator and in the very southwestern corner of the Pacific Ocean. It is just about as far across (diagonally) the Pacific as you can possibly travel — 7500 miles from San Francisco to Sydney.

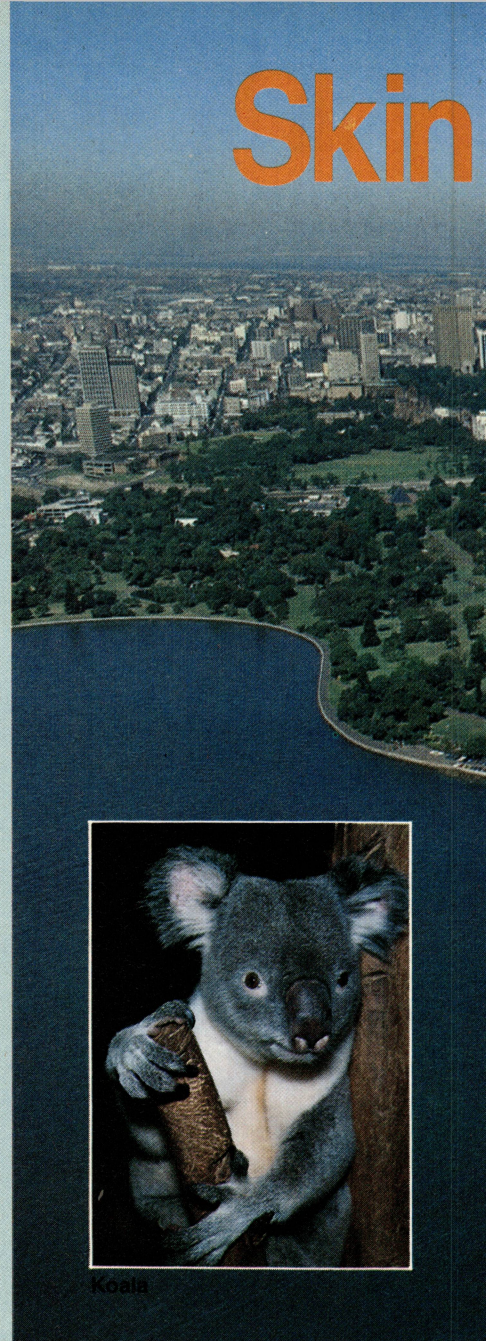
Australia is just about the same size as the United States and only slightly different in shape. It has the unique distinction of being dually described as the world's largest island and the world's smallest continent. For its size, Australia has a very small population — barely 15 million as compared to 226 million in the United States. Australia is still a frontier land with wide open spaces and room for future development. Australians speak English and are very friendly and sociable, and genuinely like Americans. Most visitors from the U.S. imme-

diately fall in love with this wonderful country and feel quite at home.

Because Australia is below the equator and west of the International Date-line, everything appears upside down and backwards. For example, the farther north you travel, the warmer it gets. In Australia, January is the peak of the summer season and July is the middle of winter. When it is Monday evening in Chicago, it is Tuesday morning in Sydney. You lose an entire day when traveling from the U.S. to Australia, but gain it back when returning home. For most Americans, it takes a few days to adjust to these down-under differences.

Although Australia is a long way from the U.S., getting there can actually be a lot easier than reaching some of the more remote islands in the Caribbean. Qantas, Australia's international airline, operates a fleet of sixteen 747 jumbo jets with service to all parts of the world. They offer daily flights direct from San Francisco to Sydney, plus several flights weekly direct from Los Angeles to Sydney. The newest and most interesting Qantas service is a flight once a week, direct from San Francisco to the city of Townsville, located right in the heart of the Great Barrier Reef area. Flights to Australia average 14 hours, including a one hour layover in Honolulu for refueling. Qantas offers three different classes of passenger service for their customers. Tourist Class is the most economical, yet it is quite comfortable and accompanied by good food. Business Class is much like First Class on most other airlines, with wide, comfortable seating and excellent meal service. However, the Qantas First Class is really in a class by itself. The seats fold down into beds and the meals are absolutely sumptuous. Two in-flight movies are shown during the Pacific crossing.

Australia has become such a popular tourist destination that many airlines now offer direct flights to this part of the world. Heading the list is Continental Airlines which also carries divers to such dream destinations as Micronesia, Fiji and Hawaii. Other airlines serving this



Koala

photos/Geri Murphy

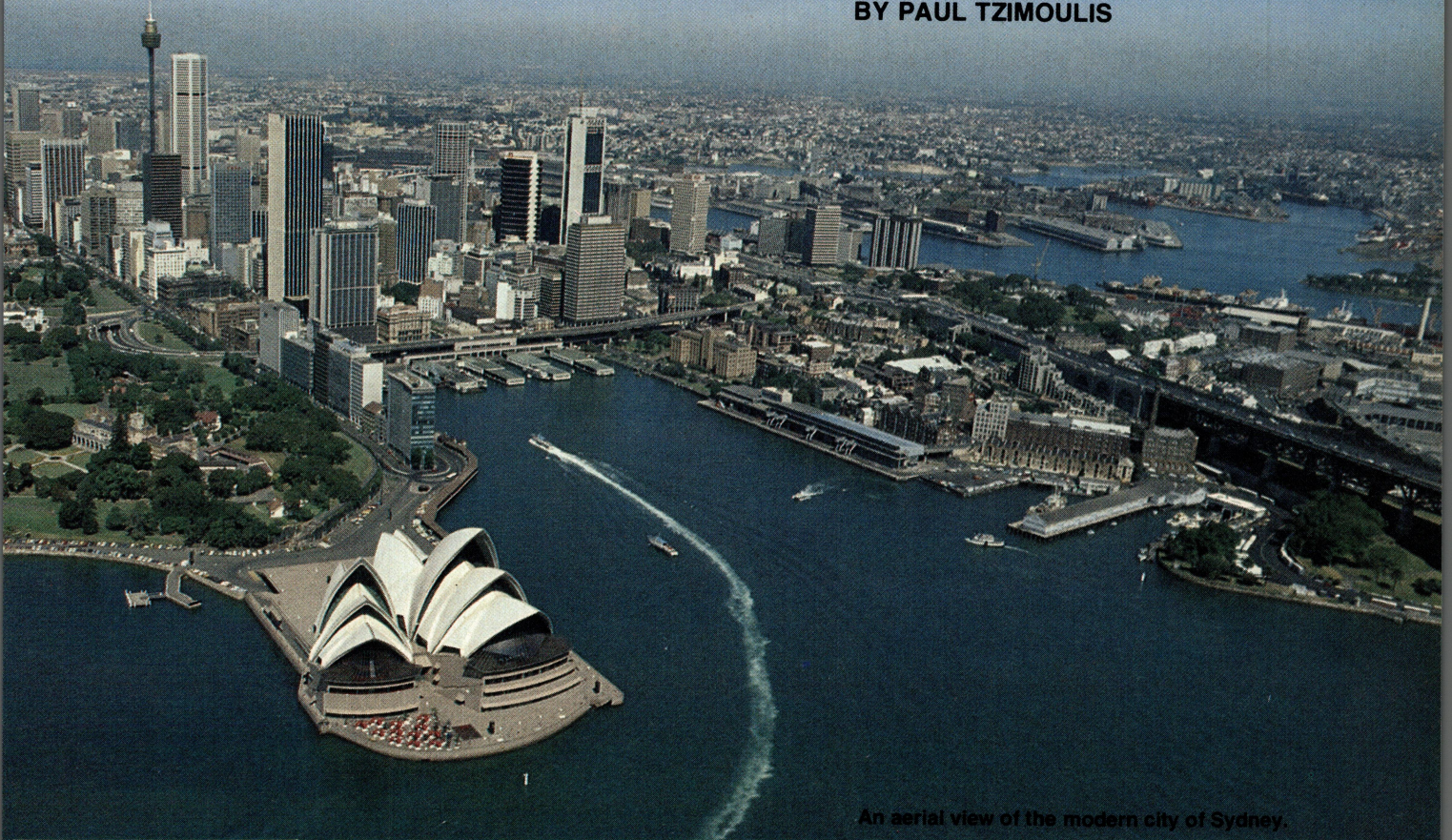
trans-Pacific route include Pan Am and Air New Zealand.

Since most incoming flights arrive in Sydney (located in the south) there is a need to travel northward 1000 to 2000 miles, depending on which part of the Barrier Reef you intend to visit. Traveling within the country of Australia is an absolute pleasure. All major cities are connected by a modern network of jet airline service, with frequent daily flights and on-time service. SDM used TAA (Trans Australia Airlines) for all of our travel and found their service to be delightfully efficient and much more friendly than most airlines here in the U.S.

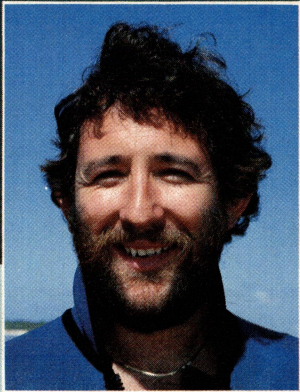
Australia's best known tourist attrac-

Diver's Guide to Australia

BY PAUL TZIMOULIS



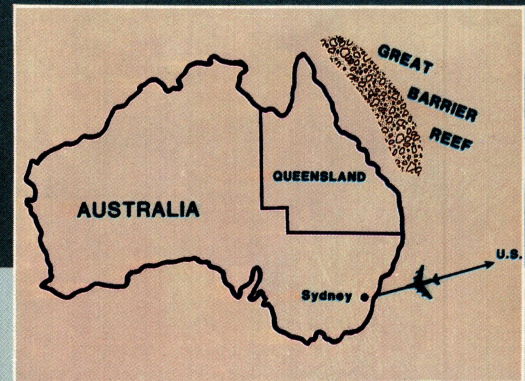
An aerial view of the modern city of Sydney.



David Loughnan,
Director of Dive In Australia



Qantas operates 747 flights from the U.S. to Australia. TAA has jet service throughout Australia.



The Great Barrier Reef is located off the northeast coast of Australia. Nearly as large as the United States, Australia is the world's largest island.

tion is of course the Great Barrier Reef. It has been described as the world's largest living thing — a community of living marine organisms stretching for an incredible distance of 1250 miles.

One cannot really appreciate the immensity of the Great Barrier Reef until you actually go to Australia and see it in person.

It is absolutely vast in size and its length is equal to the distance between New York and Miami. If this reef were somehow magically transported to the western hemisphere, it would reach clear across the Caribbean Sea from Miami to Bonaire.

The Great Barrier Reef is virtually a

world unto itself. It lies 20 to 50 miles off the Australian coast, far beyond the reach of beach divers or small skiffs. In order to reach it, you must put out to sea in a good size boat with navigation equipment and radio. The only way you can gain any sort of perspective is to view the Barrier Reef from an aircraft.

Australia



Top, fish feeding at Heron Island's Big Bommie is a favorite underwater pastime.

Above, the Heron Island dive boats can carry up to 30 fully-equipped divers each.

Right, the colorful Australian sweetlips is a popular fish for handfeeding and photos.



Like everything else in life, the Great Barrier Reef has its share of good and bad parts. Some areas of this gigantic coral structure are fantastic for diving, offering 100 foot visibility and a mind boggling array of delicate corals. Other areas of the reef can be murky due to tidal action or shifting sand. Because the Great Barrier Reef is used by all sorts of sportsmen including fishermen, sight-seeing tourists, sailors and tropical sun worshippers, there is much confusion over who is offering what. It seems like every glass bottom boat operator and fishing charter boat is offering trips to the Great Barrier Reef, but few actually provide the kind of service that serious divers require. Visiting divers must be careful to select those services specifically designed for divers.

Australia offers three distinctly different and somewhat separate areas and types of diving. The first is an island based resort operation located within the boundaries of the Great Barrier Reef. This type of diving vacation revolves around an idyllic tropical island with daily dive trips to nearby coral reefs and neighboring islands. Because such islands are located well within the Great Barrier Reef itself, underwater visibility ranges from 40 to 100 feet, but the corals and marine life are absolutely fantastic.

The second type of Australian dive vacation is a one week to ten day cruise along the outer edge of the Great Barrier Reef, extending well beyond the normal range of charter fishing boats and other tourist facilities. This type of dive trip takes visitors to fabulous coral drop-offs, big fish action and underwater visibility that can range from 60 to 200 feet.

The third type of vacation is a ten day to two week cruise out into the Coral Sea, 200 to 300 miles beyond the Great Barrier Reef. It is out in the Coral Sea that one finds the remote and untouched coral atolls and reefs which afford some of the finest diving in the world. Underwater visibility can range from 150 to 300 feet and the marine life is absolutely fabulous. Manta rays, great schools of fish, 500 pound groupers, and 200 foot tall pinnacles are a common occurrence in this part of the ocean. The Coral Sea is regarded as having the finest quality diving anywhere in the world.

One of the factors which has greatly simplified travel and diving in Australia is a new company called Dive In Australia. Based in Sydney, this small travel company serves as general sales agent for all of Australia's top resort diving services and coordinates travel arrangements for visiting divers. Owned and operated by David Loughnan, Dive In Australia can set up your dive vacation aboard a dive cruise boat headed for the Coral Sea, or a week on a tropical island resort. David is in touch with both his customers and resort clients by telephone, radiophone or telex, and can provide prompt confirmation on a reservation.

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Heron Island

Heron is a flat coral island like many that exist in the Great Barrier Reef chain. It is oblong in shape and encircled by a ribbon of white sand beach. Most of the island is barely eight feet above sea level and it is covered by a dense forest of *Pisonia* trees. The island is really tiny in size, barely measuring three-quarters of one mile in length and one-half mile in width.

Getting to Heron Island can be an adventure in itself, as you will travel on several types of modern conveyances before reaching your destination. While the trip may sound complex, it actually moves along quickly. Heron Island is situated at the southern end of the Great Barrier Reef chain, and lies some 50 miles off the Australian coast. Its position is approximately 1000 miles north of Sydney and therefore requires air travel in several stages.

Upon your early morning arrival in Sydney, on your trans-Pacific Qantas flight, you may choose to spend a day or two in this marvelous harbor city or you may prefer to continue your journey on the very same day. From Sydney, you board a TAA 727 jet and fly north to Brisbane, the largest city on the Queensland Coast. This flight takes about one hour and 15 minutes. At Brisbane you change flights and board a smaller F-27 turbo-prop. Your journey continues northward along the Queensland Coast with intermediate stops at Maryborough and Bundaberg. The final destination for the turbo-prop flight is Gladstone, a small seaport town opposite Heron Island. At Gladstone, you once again change flights and this time board a helicopter which will complete the final leg of the journey.

The climate at Heron Island is tropical but pleasant. Blue skies and a tropical sun provide the energy for suntans and beach style living, but sea breezes help to stabilize the temperature. Air temperatures during the day average 88°F and cool to 78 degrees at night. Shorts,

sandals, light T-shirts and a wide brim hat are the perfect dress for life on this balmy tropical isle. Water temperatures at Heron range from 75 to 80°F depending on the time of year. A wetsuit jacket or shortie can make your diving more comfortable.

THE HOTEL

Heron Island Resort is sort of a mini-village consisting of 35 assorted buildings and winding pathways, clustered together at the edge of the shore. The buildings are spread out under giant trees and separated from each other by thick shrubbery. The buildings vary greatly in size and contain all types of hotel accommodations, ranging from doubles to four beds in a room. The rooms are not luxurious, but they are clean and well maintained. Instead of air conditioning, most rooms are equipped with ceiling fans which do an adequate job of cooling the guests. In total, there are over 70 rooms that can accommodate up to 210 guests.

THE DIVE SHOP

Heron Island has an extensive dive shop facility as both snorkeling and scuba are major activities for this island resort. The dive shop is well stocked with a complete sales department of scuba gear, wetsuit shorties and snorkeling accessories. They maintain an inventory of 55 aluminum rental tanks and operate three large air compressors.

The Heron Island dive boat fleet consists of four custom-built craft designed specifically for diving. The two largest boats are 34 feet long with extra-wide beams and a capacity for 24 to 30 divers each. A 20 foot dive barge is used for carrying smaller groups up to 20 divers. The pride of the fleet is a high speed 23 foot Shark Cat used for long range dive trips to neighboring islands and remote coral reefs. All of the dive boats are shallow draft vessels capable of navigating among the coral reefs.

Divers prepare to board the Heron Island dive boat—directly from the beach—for the morning reef trip.



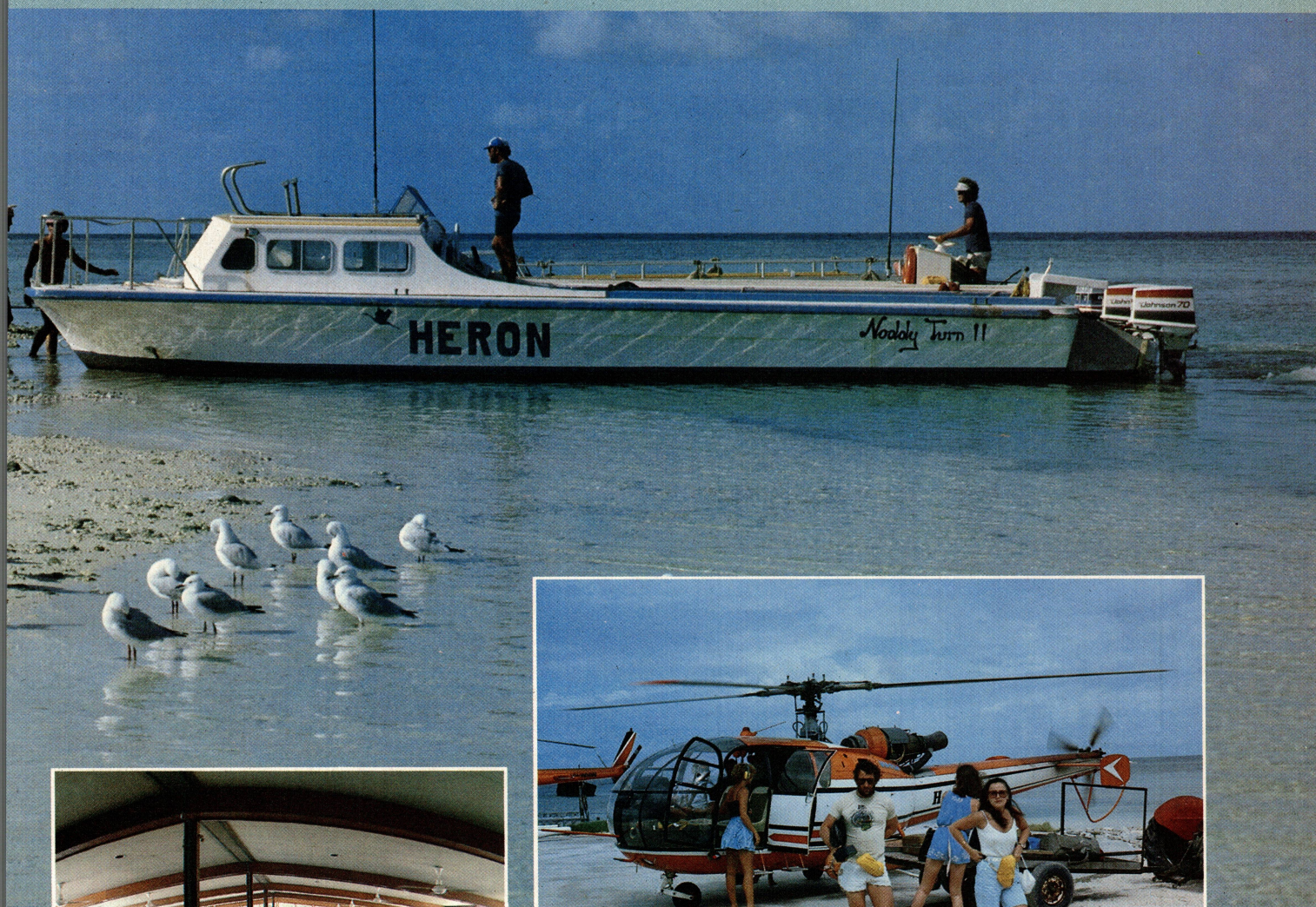
An aerial view of Heron Island ringed by ocean.

The head divemaster at Heron Island is a quiet, unassuming gentleman by the name of Colin Lewis. Colin is exceptionally polite and extremely considerate of his guests' needs and requirements, yet he exhibits firm leadership based on years of experience.

Heron Island offers two scheduled scuba dives daily—a morning trip departing at 9:20am and an afternoon trip departing at 2:20pm. There are no night dives because of the severe navigational hazards in attempting to run these shallow reefs in the dark.

THE DIVE SITES

Underwater visibility in the Heron Island area is not the best that you will find



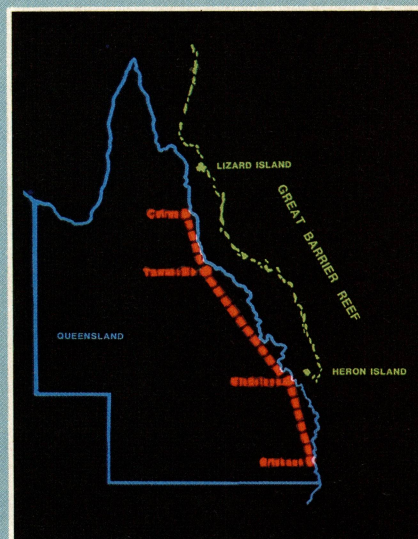
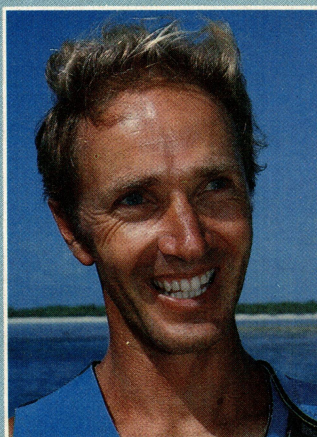
The Heron Island dining room seats over 200 guests.

Near right, Heron Island diving director, Colin Lewis.

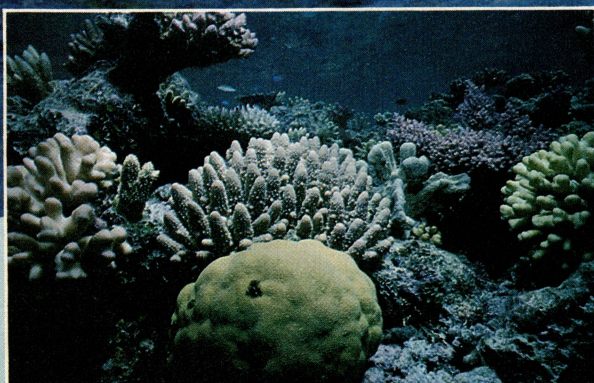
Far right, the Great Barrier Reef runs for 1250 miles and Heron Island is located at the southern tip of it.



Guests arriving by helicopter on the beach at the Heron Island Resort.



Heron Island



Above, the Great Barrier Reef is often awash at low tide. Far left, beneath the surface, the reef is paved with colorful corals. Near left, among the corals are exotic nudibranchs.

in Australia. In fact, some American divers might almost find it disappointing if they were not prepared for what they may encounter. To be frank, the underwater visibility around Heron Island is just average — similar to the conditions you might encounter in the Florida Keys or among California's offshore islands. Underwater visibility can range from 40 to 100 feet and it is as changeable as the tides. Visibility is certainly not as great as that found along the outer edge of the Great Barrier Reef (north of Cairns) or the superb clarity which exists in the Coral Sea. There are, however, other advantages which make this situation a reasonable trade-off. Heron Island is a land-based resort which offers the comforts and spacious living not attainable on a dive cruise boat. You can arrive or depart from this resort on any day you choose, and most boat trips are of short duration. Heron Island is the kind of resort that the entire family can enjoy.

Perhaps the greatest attraction among the reefs of Heron Island is the incredibly heavy concentration of fish life that flourishes among these reefs. The fish are

protected by law and are hand fed on an almost daily basis. It seems as though these fish have spread the word among all their friends, for the numbers of fish continue to increase on a yearly basis. Heron Island now has the greatest collection of tame fish in Australian waters. A dive at Heron is like entering a giant goldfish bowl, where the diver is on exhibit and the fish are the audience. Perhaps the best known fish dive at Heron Island is a world famous spot simply called **Big Bommie**. This is an Australian expression for a large coral head and there are indeed a number of them at this location. These giant coral structures are 20 to 40 feet in diameter and rise up from the bottom almost 30 feet. Diving depths range from 15 feet at the top of the shallowest coral head to 100 feet at the base of the deepest.

Barely ten minutes away from the Bommie is a unique reef location known as **Blue Pool**. This site was once a giant tidepool, but a storm has broken away one side of the reef, thus opening the tidepool to the sea. This unusual formation now appears as a circular cut-out in

what is normally a straight reef line. Diving depths inside the Blue Pool average 30 feet, with the sides of the pool rising vertically, almost to the surface. In addition to its unique coral structure, Blue Pool is loaded with schools of fish, an abundance of clownfish and anemones, a giant batfish and several large moray eels. There is even a small white-tipped reef shark living in the pool area.

Approximately 20 minutes by boat from the harbor brings you to a fascinating dive spot known as **The Tenements**. Diving depths range from 10 to 60 feet and there is a small vertical wall that starts at 30 feet. This site is a favorite congregation point for large fish.

In all, there are more than 30 different dive sites around Heron Island, and perhaps many more that are too numerous for regular visitation. Visitors should plan on staying at least one week at this marvelous island retreat in order to obtain a good sampling of the excitement and variety existing there. Heron Island is one of the few remaining places on earth where a diver can admire and appreciate the reef ecology untouched and intact.

See you on
HERON ISLAND

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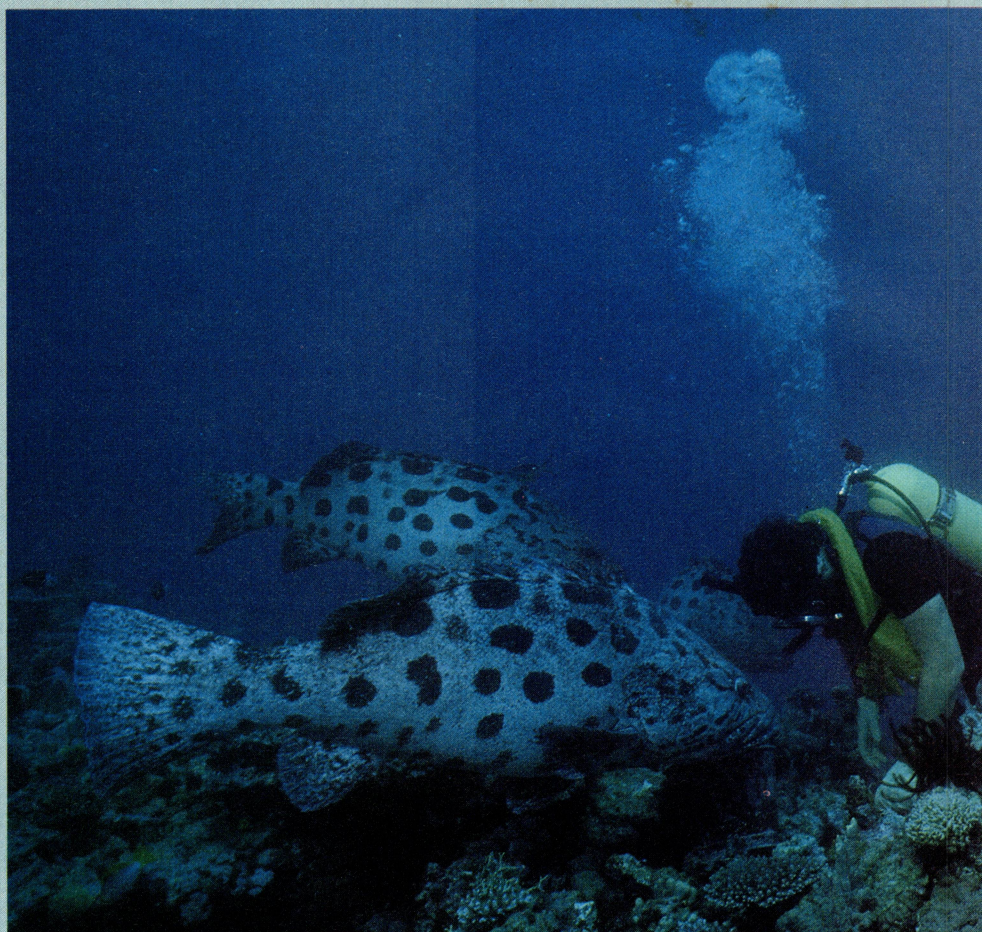
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Our dive boat is anchored on the outer edge of the Great Barrier Reef and the horizon is one continuous, straight line of open sea. We are on board the M/V *Auriga Bay*, one of Australia's finest and best-equipped dive cruise boats. We have traveled close to 150 miles north of Cairns in search of the very finest dive sites — specifically for the purpose of experiencing an underwater adventure which almost defies description. Our dive boat skipper, Captain Kerry Piesch, has deftly navigated our vessel to within 50 feet of one of the most secret dive locations along the entire length of this magnificent reef. We have come to a place known simply as the **Cod Hole**.

With David Loughnan as our underwater guide, our eager group quickly suits up with excited anticipation. We make our entry from the foredeck and pull our way along the safety line attached to the anchor. From the surface, I can see the shadowed outline of many large coral heads 70 feet below. And, cruising among the corals are the dark silhouettes of several giant fish. As we descend toward the bottom, the great shapes take sharper form. Before our fins touch the coral, there are at least three giant groupers circling our small group. Each fish is at least five feet in length and must weigh 150 to 170 pounds. I am absolutely awed by their immense size and total disregard of our presence.

David Loughnan feeds a group of giant groupers at Cod Hole. Each fish weighs 120-150 lbs.



Great Barrier

David casually swims to the top of a high coral head and seats himself comfortably for the upcoming feeding session. He has brought along a two gallon metal pail filled with huge chunks of fish bait. The first offering is like sounding a dinner bell, and the big fish begin to close in. David's treat is gratefully accepted and the hand-sized chunks of fish are gulped down like popcorn. A hefty 140 pound grouper levels off in front of David and stares into his facemask, barely six inches away. It hangs there motionless in mid-water like the Goodyear blimp, patiently waiting for another piece of fish.

By now, there are seven or eight of the giant creatures gathered around David. They circle the coral heads slowly, mov-

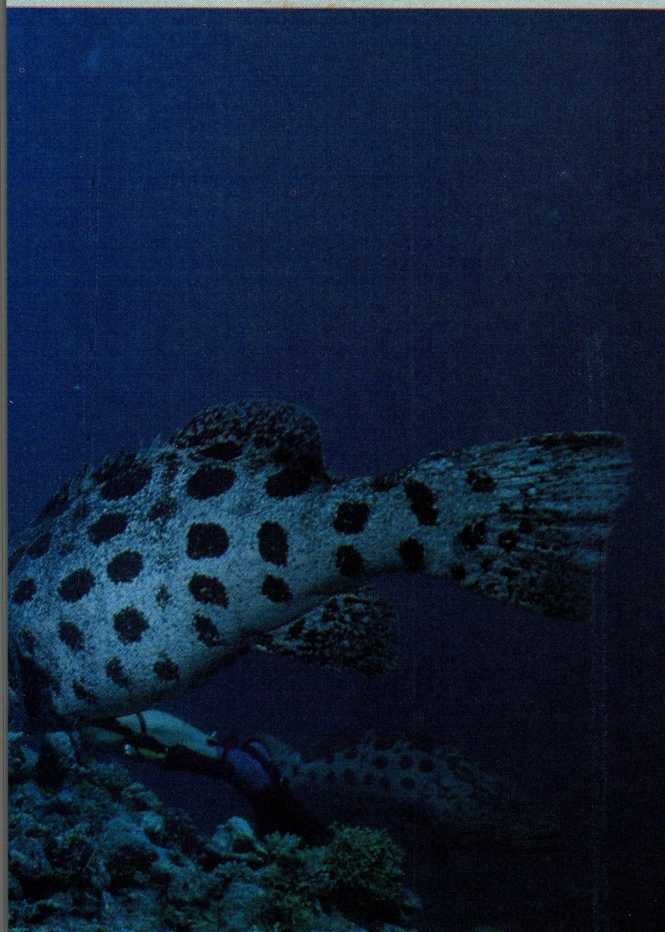
ing in and out randomly, as they search for the source of the delicious food scent. Where they come from and how they know of our presence is an unsolved mystery.

According to Captain Kerry, this marvelous underwater phenomenon was first discovered by Ron and Valerie Taylor many years ago. In Australia, these giant groupers are called potato cod and thus the dive spot was named Cod Hole. This particular species of grouper is far different from its Caribbean cousins. It is a huge, white grouper with large, black splotches that resemble spots. Although these fish are the same general shape as other groupers, their giant heads are so grotesque that they are actually beautiful.

Their enormous mouths and tiny eyes provide a laughable appearance, making them look like underwater Muppets.

Despite their size, these mammoth fish possess a gentle disposition. They patiently wait for the diver to dole out the small portion of fish food. The big fish playfully nudge and push each other from side to side as they compete for the handouts, but there is never any fighting or snapping between them. Only once or twice did we sense their incredible strength as one of these brutes would accidentally lean against our bodies. It was a gentle but steady force that felt as if some enormous cow or horse were pushing you to one side.

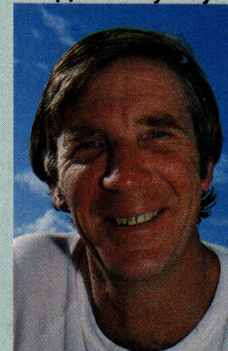
After five or ten minutes of fish feeding,



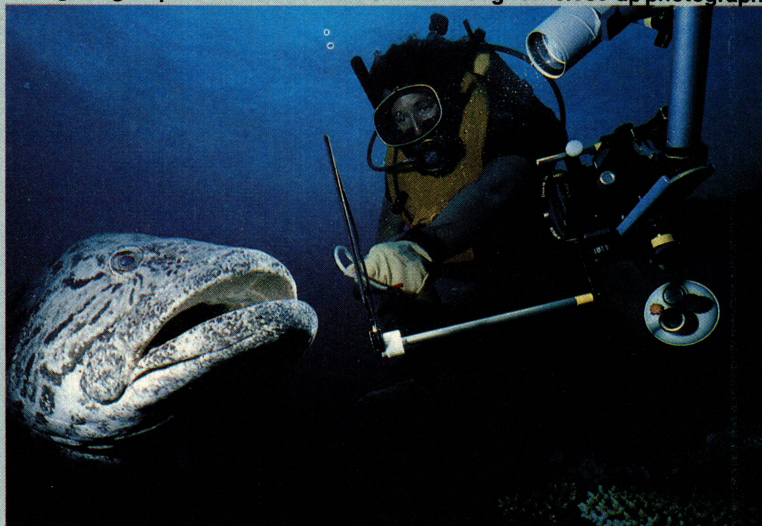
The 50ft. M/V *Auriga Bay* cruises the edge of the reef.



Skipper Barry May.



The giant grouper at the Cod Hole are tame enough for close-up photographs.



The giant groupers living at Cod Hole hover over the reef like silent, spotted blimps.

Reef

the big groupers became extremely friendly toward the divers. You could actually pat them on the head, stroke the sides of their bodies or scratch them under the chin. The big fish did not seem to mind coming in contact with us, visitors from another world. It was one of those exhilarating underwater adventures that a diver remembers for the rest of his/her life and can hardly stop talking about.

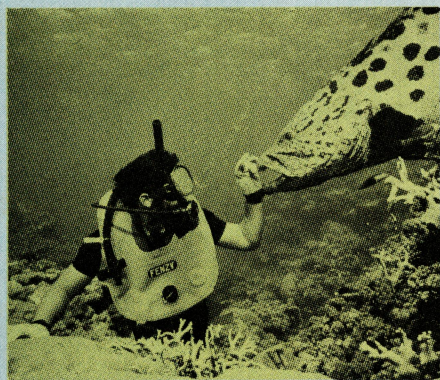
The giant groupers of Cod Hole are one of those rare natural phenomena that occur once in a generation. Nowhere else along the length of the Great Barrier Reef do these huge groupers congregate in such a large group and freely associate with divers. Normally, the potato cod is a very shy and cautious creature who re-



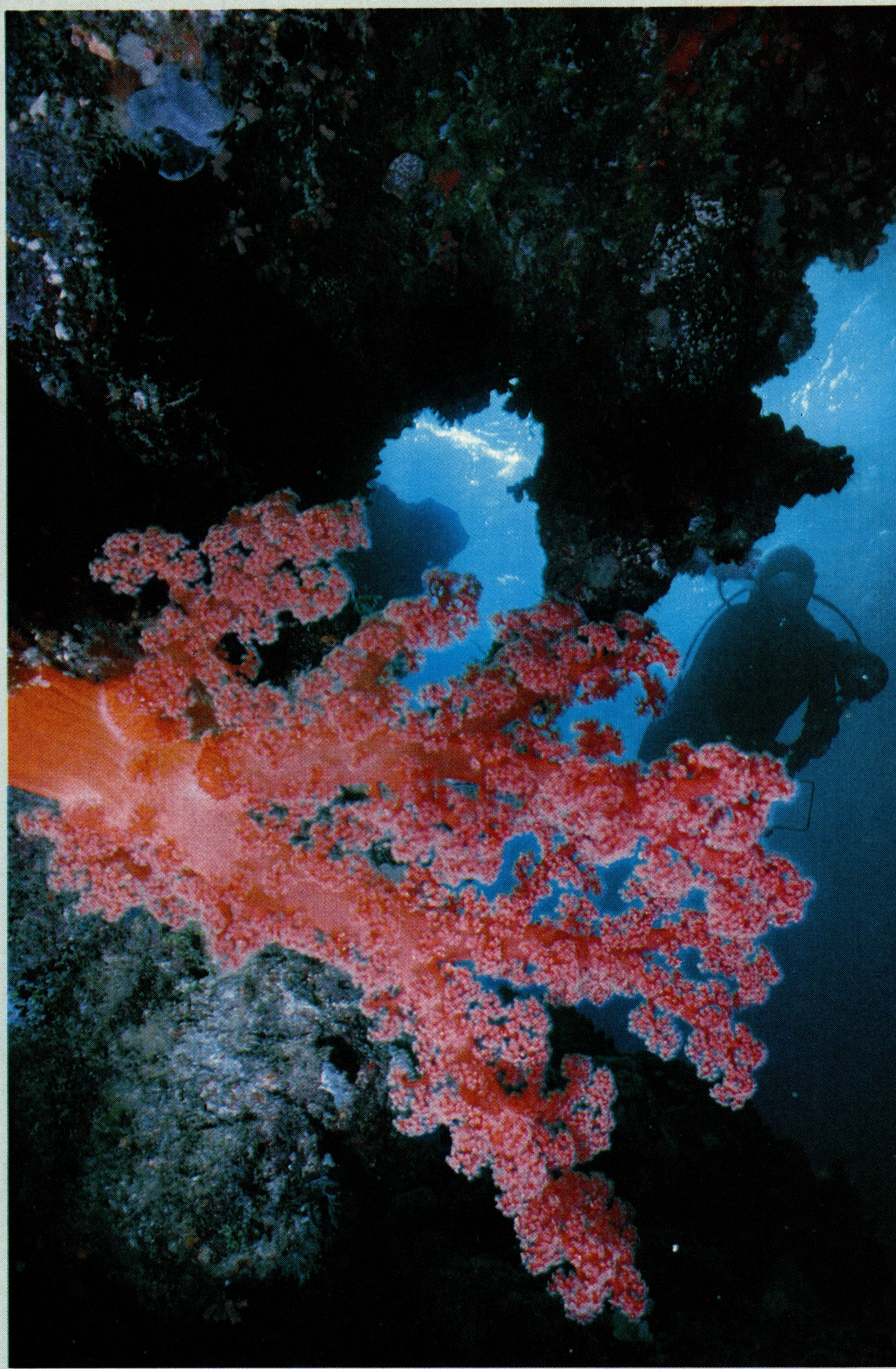
treats at the first sight of a diver. Seldom do you see them in groups and even more unusual is the opportunity for close contact with these big fish. Yet, at Cod Hole there are about 18 of these enormous creatures who are willing to eat from your hand. One dive with these incredible fish is worth the price of the entire trip to Australia!

A dive at the Cod Hole is just one small sample of the amazing adventures that await divers visiting the Great Barrier Reef. This amazing chain of loosely connected coral reefs and uninhabited islands is a fabulous fantasy world of exotic underwater creatures and richly colored corals. In some areas, underwater visibility frequently exceeds 150 feet and there are many days when the clarity is a stunning 200 feet plus. There are drop-offs that begin in 20 feet of water and form a sheer vertical wall to 1000 feet or deeper. Manta rays, tuna and sharks cruise along these walls like buses on a freeway — another one seems to pass by every five minutes.

There are steep sided channels or cuts between coral reefs which offer the thrill of a high-speed drift dive. In many cases these channels are loaded with schooling fish and unusual marine life, attracted by the outflow of food carried by the currents. There are great undersea caves and winding tunnels which frequently honeycomb the reef and provide a spine



Hand feeding a giant grouper takes a certain amount of skill — to avoid losing your glove.



Many brilliantly colored soft corals adorn the vertical walls of the Great Barrier Reef.

Great Barrier Reef

tingling opportunity for careful exploration unmatched by subterranean spelunking. There are shallow coral gardens so loaded with color they appear unreal. A dive into these five to ten foot deep aquariums is like a fantasy trip into a lollipop world of candy delights. A diver can spend hours peering into this miniature fairyland of crabs, shrimp, tropical reef fish and other colorful characters. In some areas, giant clams grow thick as weeds. If a diver had the time and inclina-

tion he might count 40 to 60 of these 500 pound bivalves in a single acre of ocean floor.

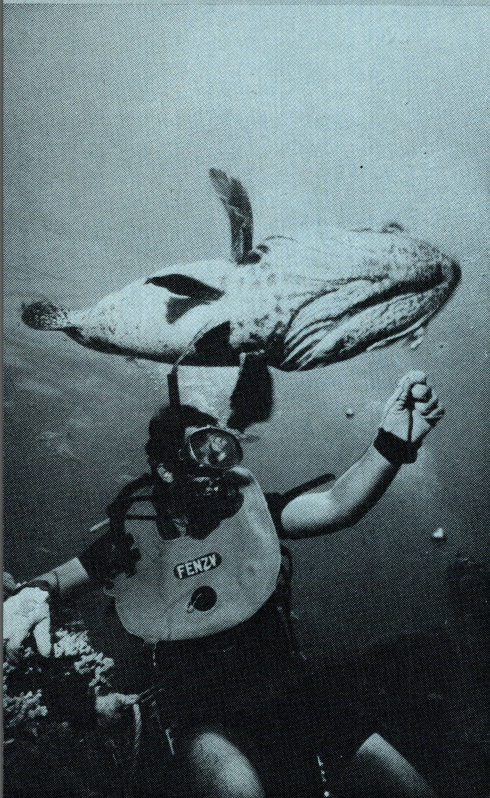
The only problem with the Great Barrier Reef is its immense size. With over 1250 miles of coral reef available one hardly knows where to begin. Like most everything else in this world, the Great Barrier Reef has its good and its not so good areas. Some segments of the Great Reef are murky, barren or colorless. Other portions of the reef are extraordinarily beauti-

ful. As one might suspect, the very best portions of the Great Barrier Reef lie in the most remote and inaccessible areas, far from any civilized community. The best parts of the Barrier Reef lie beyond the reach of the one day charter boats, sport fishing vessels, glass bottom boats and other tourist facilities. It is not unusual for serious divers to cruise more than 100 miles (one way) in order to reach the really fantastic spots that lie in the remote outer reaches of this vast coral complex.

GETTING TO THE BARRIER REEF

While there are many good dive locations, perhaps the very finest spots along the outer edge of the Barrier Reef can be found at the northern end of this chain,

over 2000 miles from Sydney. Getting there involves several jet flights taking the better part of a day, followed by a lengthy sea voyage aboard a long range dive cruise boat such as the *Auriga Bay*. You start early in the morning by boarding a TAA jet in Sydney for a flight to Brisbane, gateway to the Queensland Coast. At Brisbane, you generally change planes and continue your flight northward on another jet, landing first at Townsville, and then continuing to your final destination, Cairns. Total flying time is approxi-



At feeding time, the groupers of Cod Hole perform acrobatics while snatching tidbits.

mately four hours. Cairns is the most northerly city on the Queensland Coast, with a population of approximately 40,000 people. It is a tropical vacation town similar to Key West, Florida, filled with tourist shops, charter fishing boats, glass bottom boats, vacation motels and restaurants. Cairns is not the end of your journey but rather the beginning. It is the jump-off point for most dive cruise boat departures to either the Coral Sea or the northern Barrier Reef. From Cairns it is another ten hours sail, 150 miles northward, to the remote reaches of the Ribbon Reefs.

M/V AURIGA BAY

Reaching the remote outer edge of the Great Barrier Reef is no easy task. Therefore, it requires a very specialized boat to make the journey in safety and comfort. The motor vessel *Auriga Bay* is just that kind of ship. Measuring 50 feet in length, this sturdy vessel is all steel including the

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The MV AURIGA BAY is owned and operated by Island Marine Charters, 26 Abbott Street, Cairns, Queensland, Australia

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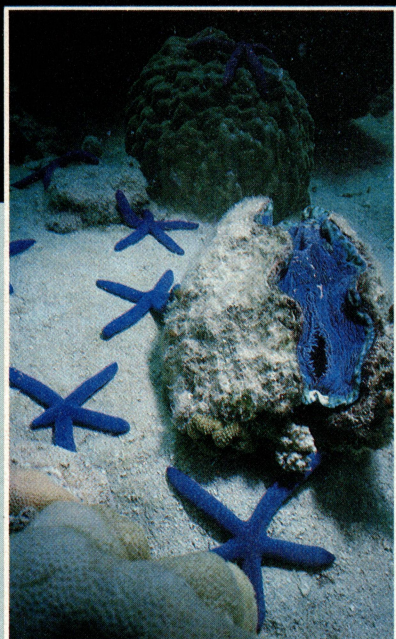
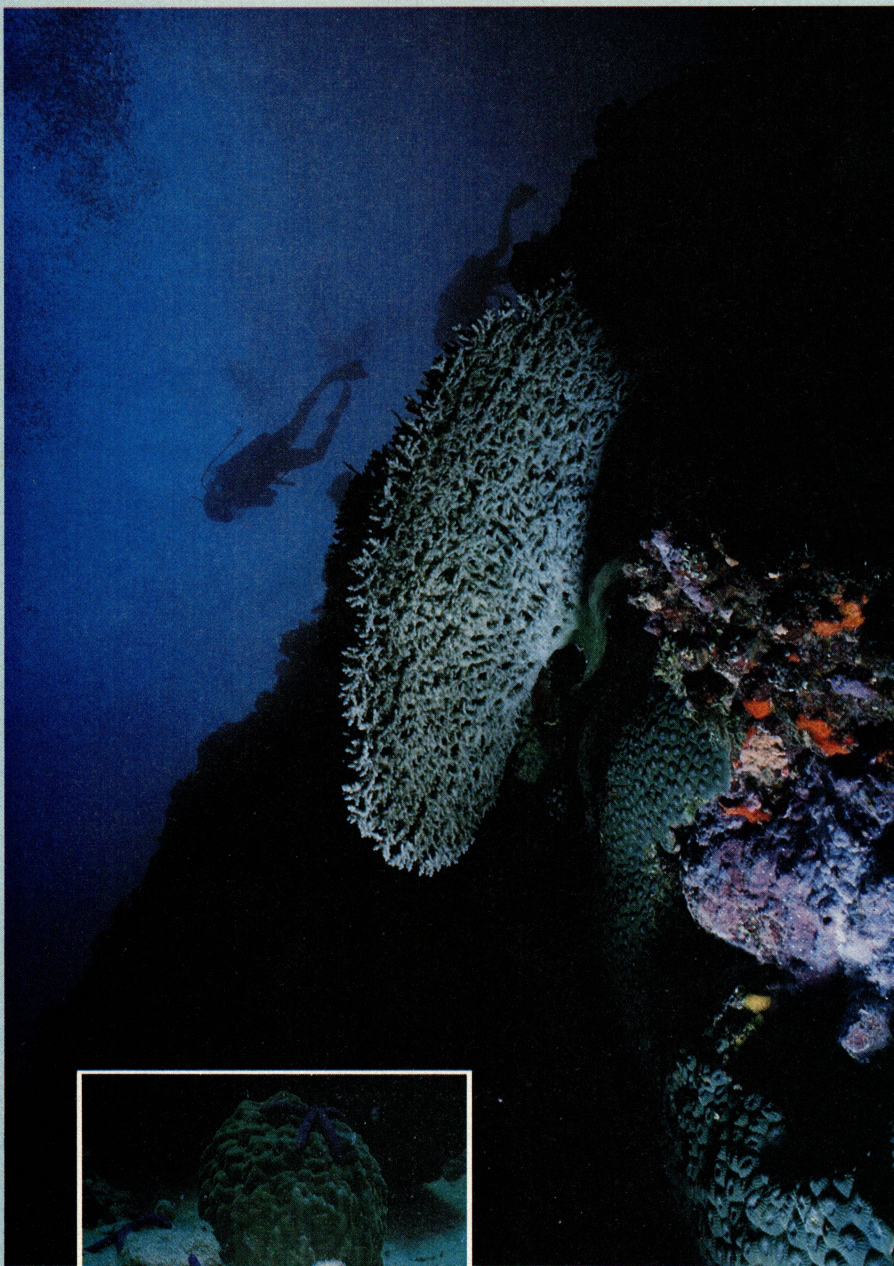
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Great Barrier Reef

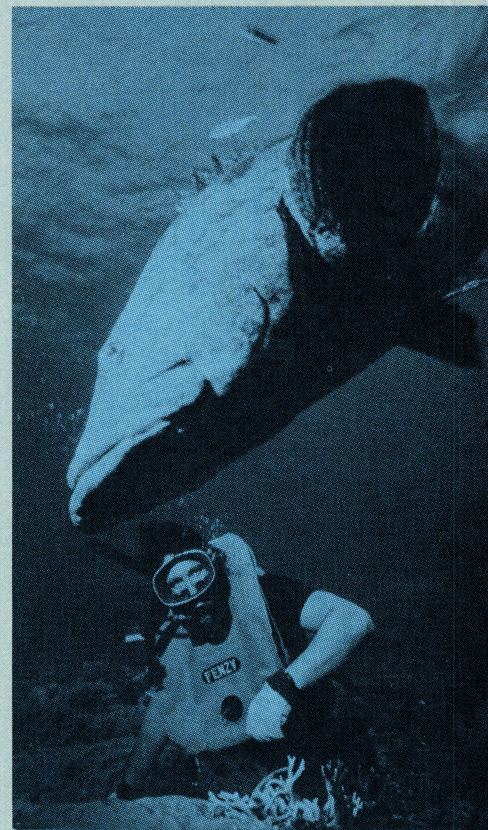


Above, the outer edge of the Great Barrier Reef offers absolutely vertical drop-offs covered with exotic hard corals, gorgonians and sponges.

Left, electric-blue starfish and giant clams are common sights on the Great Barrier Reef.

double hulled bottom. The ship is powered by a 130hp diesel with two auxiliary engines for electrical power. The ship carries over 800 gallons of fuel and has a cruising range of over 2500 miles. She also carries more than 1200 gallons of fresh water, an adequate supply for divers making an extended seven to ten day cruise.

For its size, the *Auriga Bay* is one of the best-designed dive boats in the entire Pacific. The bunks are wide and comfortable, the showers are roomy, and there is lots of space on the ship's foredeck for donning dive gear. Divers can enter the



The Cod Hole groupers weigh 75 to 180 lbs.

water from either the stern or foredeck and there is a side boarding ladder as well as a stern platform. The ship carries two air compressors and enough tanks for more than one dozen divers. Tanks are filled promptly when the boat is re-boarded.

The *Auriga Bay* carries the most modern electronic equipment for both navigation and communications on the bridge. There is a wide assortment of radios, depth finders and sophisticated electronics for cruising well beyond sight of land. And, for American divers, there is even a 110 volt AC converter for charging American-made strobes and underwater

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DIVE IN AUSTRALIA is the general sales agent and trip coordinator for Australia's finest diving operations. We have spent years researching the facilities, services and underwater attractions available.

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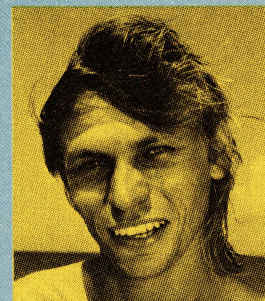
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handlights. The food and service aboard this vessel are both of the highest caliber. Passengers are well fed and treated with the utmost courtesy and cordiality.

The *Auriga Bay* is the brainchild of Barry May, a well-known Australian diver. Barry began his career more than 33 years ago by spearing fish and catching lobster in the Sydney area. During the mid-1950's, Barry, as the Australian spearfishing champion, became something of a national hero. Shortly afterward he entered the commercial dive business, salvaging scrap metal from WW II shipwrecks along the coast of Australia. By the late 1960's, Barry had expanded his salvage business throughout the South Pacific, working in the Solomons,



Dinner aboard the M/V *Auriga Bay* is a feast of fresh fish, tender meats, salad and fruit.



Kerry Piesch

New Guinea, New Caledonia and other WW II battle grounds. In the mid-70's Barry became aware of the tremendous dive resort potential existing among the fantastic coral reefs on the outer edge of the Great Barrier Reef and among the isolated atolls of the Coral Sea. Barry drew up the plans for the *Auriga Bay* and supervised construction of the entire vessel. The dive boat has been in operation for over two years and now makes regularly scheduled cruises to the very best dive locations along the northern Barrier Reef.

The success of the *Auriga Bay* has led Barry to join in partnership with three other noted Australian divers in the construction of a second vessel for dive cruises. The 60 foot *Reef Explorer* has been specifically designed and equipped to sail several hundred miles off the Australian coast among the remote reefs and atolls of the Coral Sea.

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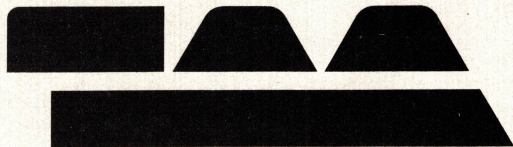
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Coral Sea

BY CARL ROESSLER

The oceanic reefs of the outer Coral Sea are a world unto themselves; they are as distant in mood and drama from the Great Barrier Reef as if they were on another planet.

To illustrate the remote and untouched nature of these pristine coral kingdoms, there was always the morning radar. Each morning I'd wander to the bridge of the *Reef Explorer* and look at the radar scope. At its furthest scan it reached out 48 miles on every side, on hypnotic electronic sweep that said, again and again, "No one, no one . . ."

That is the magic of the outer Coral Sea; that is why we have come so far and paid so much — because there really is no one else here.

For *Reef Explorer*, the Coral Sea trek is easy and pleasant. This brand-new all-steel vessel is brilliantly designed for economical use of space. She offers passengers private air-conditioned double cabins, spacious sundeck and diving-dressing areas and superb food for each evening's Mongol Hordes. Our clients were surprised at just how much privacy they had; after 12 days aboard no one felt the slightest bit cramped.

Reef Explorer's normal beat is the Great Barrier Reef, in the vast reef complex between Townsville to the south and Lizard Island in the north.

In the magic months of October and November, a wonderful thing happens. The winds die away to a whisper, and the waters often settle to a glassy calm. It is the Australian spring hush, and a sensational opportunity for divers. Like a string of perfect pearls, each more beautiful than the last, these reefs gleam a brilliant aquamarine in the cobalt-blue sea.

There are literally hundreds of dive sites. Some are sheer outer walls plunging vertically to the depths of the open ocean. Gigantic sculptured soft corals in orange, pink or red stretch their arms out over the abyss as if frozen in time. Beautiful silvertip sharks hover in the electric-blue open water, watching. Great schools of jacks and rainbow runners drift by, ever alert to approaching predators.

Precisely where are these fabulous reefs? The accompanying map illustrates a typical itinerary. The *Reef Explorer* can depart from her home base — Cairns — or from Townsville. The first day we traverse the Great Barrier Reef, an

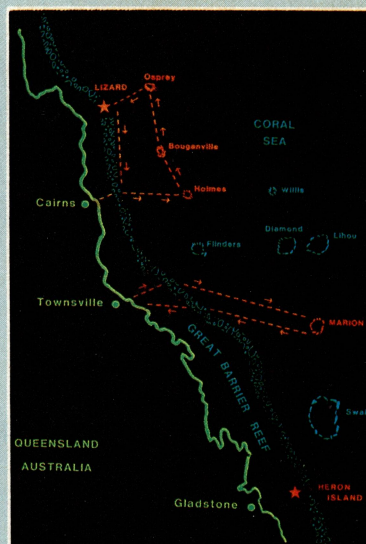
enormous band of reefs and islands whose immensity is brought home to us during this cruising day.

FLORA REEF

During our second day we reach Flora Reef, a tiny gem, to begin our under-sea adventures. The first inescapable impression we gather here is of suddenly clear water. During our passage through the Great Barrier Reef we saw water that was slate-colored due to plankton and sediment stirred by massive tidal currents; here by contrast the water is a sparkling cobalt blue. In fact, sometimes we look down vertically from the *Reef Explorer's* deck and there almost seems to be no water between us and the reef panorama. One look at the map tells us why. These oceanic reefs of the Coral Sea are 50-150 miles out in the open sea beyond the outer limit of the Great Barrier Reef. This ocean water in its long slow traverse of the equatorial Pacific has warmed and dropped out its sediment. Its plankton level is much lower than the rapidly-moving, tide-driven waters that churn amid the Great Barrier Reef. As a result, visibility frequently exceeds 200 lateral feet, and I have seen clarity in excess of 240 feet. It tends to spoil you . . .

During our 1980 cruises we had one of our most dramatic interludes at the northern end of Flora. It started the moment I jumped off the dive platform with my cameras. As soon as I looked down from the surface I knew it would be no ordinary dive, for 50 feet below a 200 pound grouper stared up at me curiously. The other members of our group were in various stages of dressing and entering the water. I called to alert them to our unusual visitor, then decided to go ahead and get acquainted before too many divers approached and scared him off. I drifted carefully down through the clear water, settled on the bottom, leaving my close-up camera rig there; only a wide-angle lens would do justice to this marvelous creature.

Cautiously I paused to check the strobe aim and f stop on my wide-angle rig. When I looked up, the grouper was about to swallow the close-up camera! Considering the camera weighs 25 pounds, it would have been some morsel, but this good-natured behemoth almost managed it.

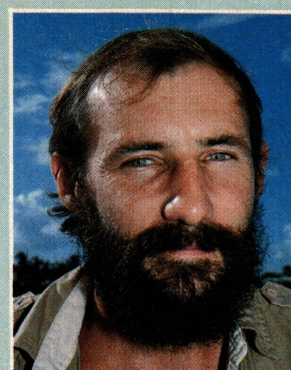
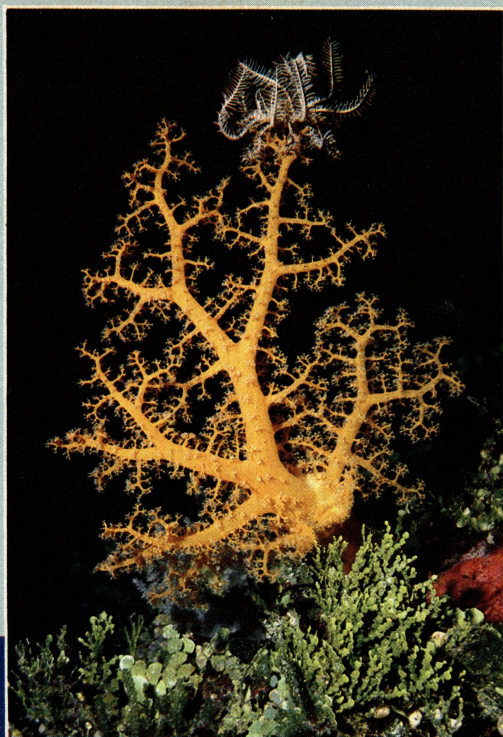


Dotted lines are *Reef Explorer* routes.

photo/Gert Murphy



The isolated atolls of the Coral Sea exhibit many marvelous coral structures.

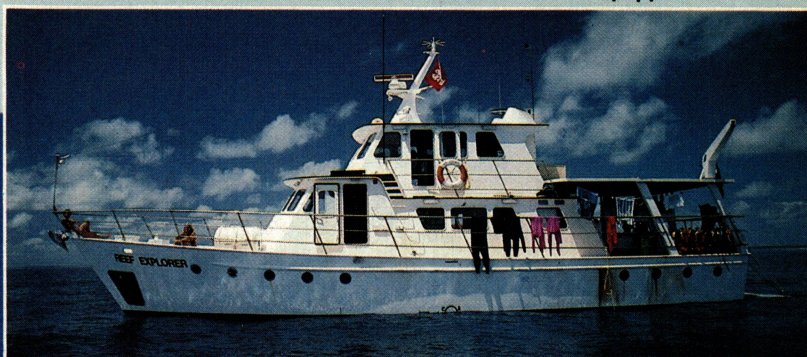


photo/Geri Murphy

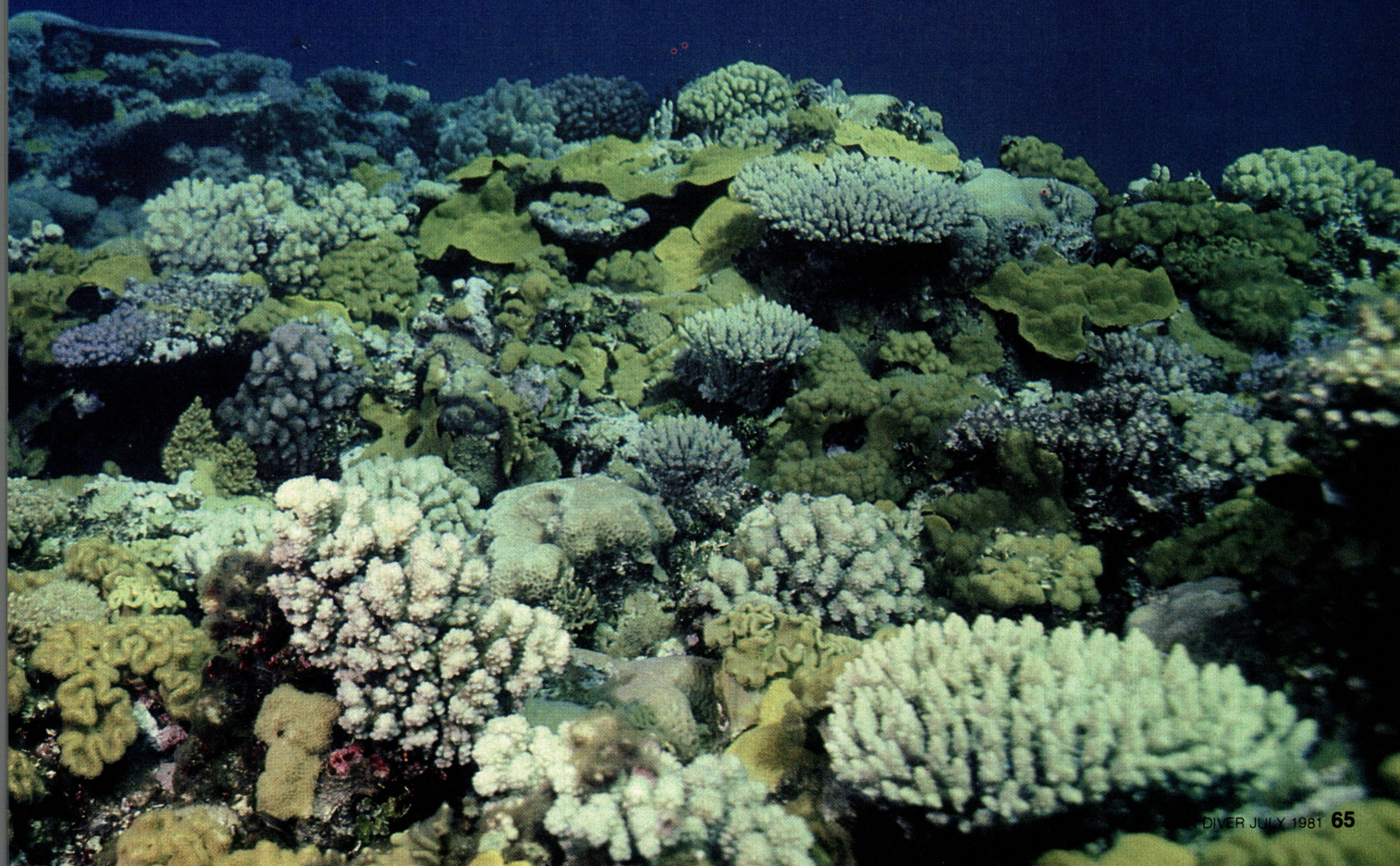
The polka dot moray, a friendly Coral Sea creature. Dive boat host, John Bound.

Left, a colony of golden soft coral is topped by a silver crinoid.

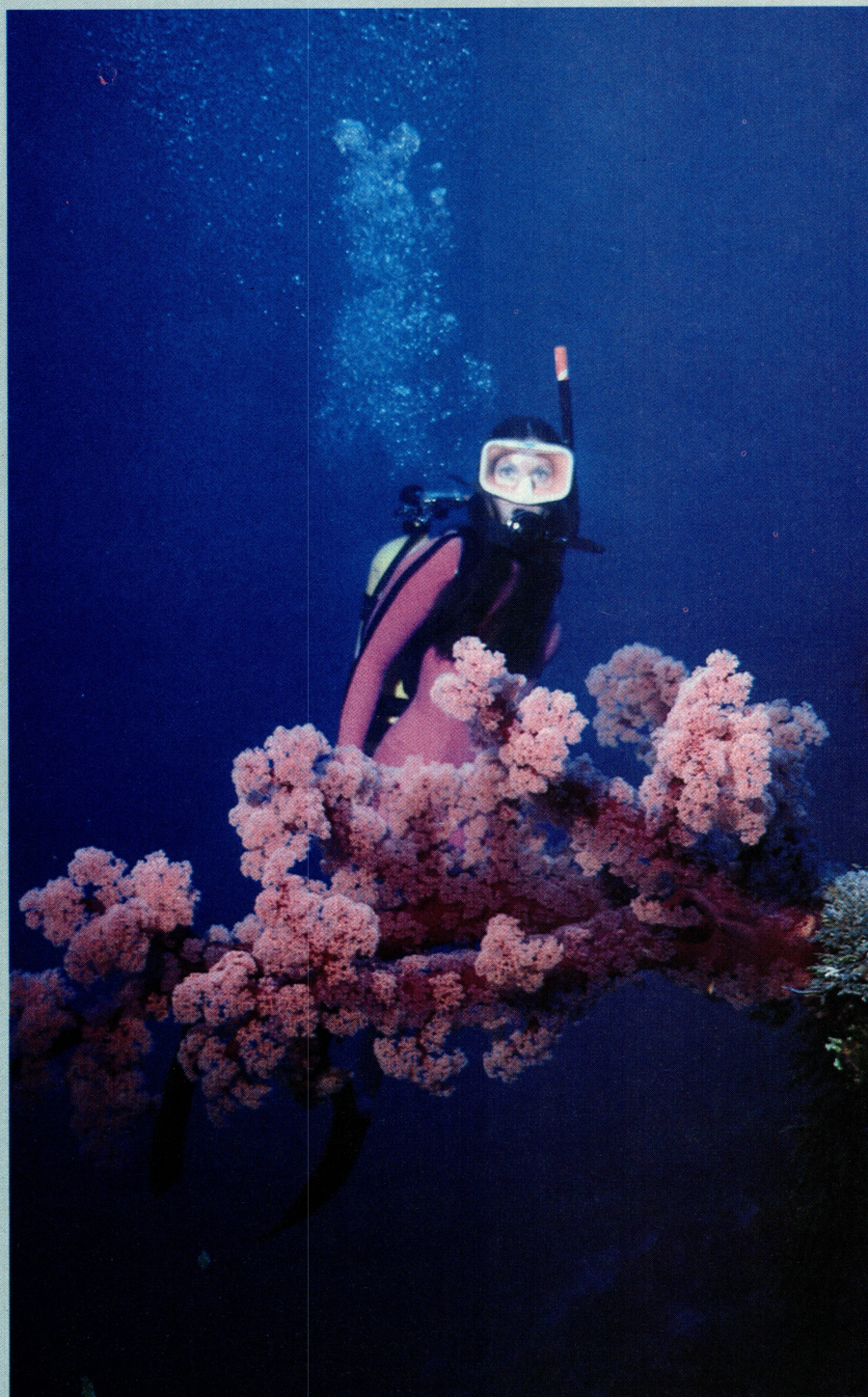
The 60 foot M/V Reef Explorer is one of the world's best-equipped dive boats.



photo/Geri Murphy



Coral Sea



Diver Jessica Roessler admires a giant soft coral tree at Marion Reef.

After a brief tug-of-war, there began an afternoon of supreme enchantment as ten divers became intimately acquainted with this intelligent, curious mammoth. We petted him, fed him, and fried his eyeballs with strobe light. Again and again he returned, to mouth the cameras, grab a morsel of fish scraps, or just stare fixedly at us. Several times he swam up to a diver, lay down face-to-face with him and stared as the photographer took literally countless photographs. Later, on the boat, I learned that our fishy friend with the foot wide smile is called a "potato cod." That's one of those fascinating tidbits from Australia. The original settlers were prisoners sent far from Mother England in penal servitude; growing up in England the only fish types they knew were native cod and trout. To this day, Australians call various species from groupers to lionfish "cod" or "trout."

As we relaxed aboard *Reef Explorer* that evening we joked about Australian nomenclature and marvelled at our experience.

DART REEF

Dart Reef is an overnight cruise from Flora, further out in the Coral Sea. Dart is a flat seamount, perhaps two miles across, whose top is a mere foot or so beneath the surface across its entire area. One curious result of this is that it is very difficult to drop *Reef Explorer's* anchor at Dart. Captain John Bound's technique is pragmatic; he nudges the bow right onto the reef and drops the anchor right on top of the coral plateau. Then the light breeze holds the boat just off the sheerest vertical wall of the tip. Dart is magnificent — the plunging wall is covered with hard and soft corals and swarming with fish. Just beneath the surface is a honeycomb of crevices and caverns to explore; you never know when a large Napoleon wrasse or big grouper will be flushed by your approach. On one of our days at Dart we arbitrarily dropped anchor on a spur of reef projecting outward at the end of the southern wall. Entering the water, we found ourselves in a sand valley with the big drop-off visible just beyond. First one, then two huge potato cods swarm up; moments later the first of five gray sharks meandered into the valley. During the course of the dive a big school of jacks, a sizeable Napoleon wrasse, several kingfish and, of course, clouds of reef fish created a dramatic wonderland for our cameras. It was another dive site at which we realized we were the first divers the local reef-dwellers had ever seen. At dinner that evening we plotted like paranoids never to tell anyone where this secret valley could be found . . .

FLINDERS REEF

An overnight cruise from Dart brings us to Flinders Reef, named, as are so many things in Australia, for the dauntless Capt. Matthew Flinders. At Flinders we

Photo/Carl Roessler

CORAL SEA

OFF AUSTRALIA

Beyond Australia's Great Barrier Reef lie the wildest and most remote reefs in the world . . . the incredible Coral Sea. Underwater visibility in this untouched paradise reaches 300 feet. Towering coral pinnacles rise up from 200 feet vertically to within ten feet of the surface. Mammoth 500 pound groupers, huge Manta Rays, schools of gamefish can be an every dive occurrence.

Now you can cruise this fabulous coral wonderland comfortably and conveniently aboard the luxury dive cruiser REEF EXPLORER. Six air conditioned double cabins provide privacy and sailing offers easy access to the sea. Three superb meals are served daily as guests enjoy a casual, cordial social atmosphere. Modern scuba facilities provide unlimited air refills and non-stop diving.

Cruise into the enchanted world of the Coral Sea . . . for your ultimate diving adventure!



The MV REEF EXPLORER is owned and operated by Coral Sea Diving Charter.

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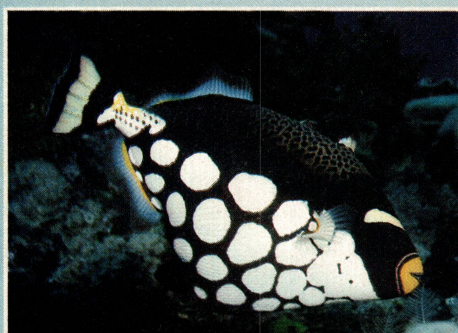
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Coral Sea



Top, divers looking for colorful crinoids will find the Coral Sea a most prolific area.



Above, although rare elsewhere, the clown triggerfish is common in the Coral Sea.

Right, a close-up of a bright yellow crinoid reveals the delicate structure of its arms.



photos/Carl Roessler

encounter the first instance of an entirely new kind of diving that is perhaps most characteristic of these Coral Sea reefs — pinnacle diving.

Both Flinders Reef and its spectacular sister reef, Marion, are large, oval atoll structures. Each has an outer rim of reef at or above the surface and an inner lagoon perhaps 200 feet deep. Scattered across the lagoon floor and nearly reaching the surface are dozens of coral pinnacles, cities of marine life of almost unbelievable size and beauty. The effect is startling and wonderful — all of the local marine life congregates at these serendipitous pinnacles.

The pinnacles vary from single, soaring towers of coral thundering upward from the deep blue to vast arrays of less vertical towers forming complex metropolises beneath the surface. The tops of the pinnacles are usually 10-20 feet beneath the surface, their intricate skin of sculptured coral gleaming and sparkling in the noonday sun. Scattered across the coral fields are sparkling crinoids (feather starfish) in a hot rainbow of colors. The world's most prodigious and vari-colored crinoid population abounds on these isolated Coral Sea gardens. For some reason these ancient relatives of the starfish have exploded into unparalleled prominence on these lonely reefs.

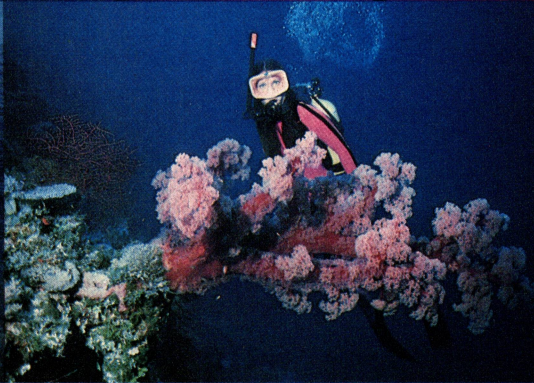
Every dive brings fresh wonders — shimmering schools of anchovy, large pufferfish, cruising turtles, enormous anemones protecting their dancing clownfish. After the first two days of the trip a remarkable behavior pattern emerges in our divers. We are all hitting the water at 6:15 am each day in order not to miss any opportunity to dive. By the end of each quite leisurely day we are each surprised to have racked up five or six dives; the cans of fresh film are disappearing like the dew on a sunny morning.

DIAMOND ISLAND

After another overnight cruise we awaken near a gem of an island, the first actual land we've seen since steaming out of Cairns. Diamond is half sandy beach, half bushy thicket, and all clamoring bird rookery. Thousands of masked gannets, red-footed gannets, frigate birds, noddy terns, sooty terns and others fly through the bushes and wheel above the sand.

Our island trek is an enjoyable break in the diving schedule, but somehow, when the day ends, each of us has made four dives as well. This diving is different: miniature pinnacles rising from a sandy bottom at 45 feet. The bright sand reflects the tropical sunlight brilliantly, and we find ourselves in an arena of intense action. As soon as we drop into the water we see a number of gray sharks slowly patrolling just above the sandy bottom. At our splashes they lazily angle upward to investigate; apparently we're not interesting, for they soon subside to their ceaseless guard duty.

Only See & Sea takes you to the very heart of the Coral Sea



That's right! These are the only programs to the incredible wonders of Marion Reef and the other pristine Coral Sea reefs. See & Sea, by exclusive arrangement, journeys far beyond the Great Barrier Reef to the heart of the Coral Sea. Join us for this and other worldwide See & Sea Adventures.

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We drop lightly to the sand bottom and are immediately face-to-face with four large tunas, their great sad eyes unmoving as they sweep majestically by.

The top of one particularly large pinnacle is wave-washed; we find the turbulent surface water aswarm with every kind of reef fish. Never having seen divers, they appear cautious but curious, and after a slow approach we find it quite easy to take portrait after portrait.

MARION REEF

It is said that for Sherlock Holmes there was but one woman; it may equally be true that for me there is but one reef. It is one of the most remote reefs in all the world, a full 250 miles out to sea from the

Queensland Coast. After coming here each year for all these years, seeing Marion again is like coming home. It has always been good to me in October, a place of relentless sun and almost no land, a place where the water teems with the unusual and dramatic. On our overnight crossing between Marion and South Diamond last fall we witnessed one of the most incredible and profound experiences; the sky was crisp and clear and filled with stars, the dead calm water crystal-clear and filled with a bioluminescent universe of shrimp. Down through the depths, sparkling like the stars above, they passed by the billions, a full ten mile shoal of these flashing creatures. For our divers it was an hour of silent enchantment, and a fitting prelude to our adventures at Marion.

Like Flinders, Marion is a large atoll whose lagoon is filled with pinnacles. Our side-scanning sonar picks out one coral metropolis after another; in the brilliant sunlight our eyes confirm swatches of green where the electronic eye has directed us.

There are two creatures that make Marion Reef different, make it in fact the culmination of any Coral Sea dive adventure. One is the sea snake, those incredibly curious relatives of the terrestrial cobra that throng Marion's reefs. Divers first encounter these snakes with near-petrification. They tiptoe about the reef trying to avoid the snakes. But, they are so numerous, and so curious, that you can't make a dive at Marion without a friendly encounter.

Marion is the northern limit of the sea snakes' range, and undoubtedly the most tropical environment they inhabit. In crystal-clear water they constitute an

unofficial Marion Reef Welcoming Committee, much to the consternation of first-time visitors.

The truth, of course, is that these exceedingly curious creatures have no hostile intentions toward divers at all. Quite the opposite. They are instantly attracted to shiny equipment such as camera housings, facemasks and decometers. They love to explore every crevice of a camera housing with their sensitive tongues until the diver is ready to shoo them away; once you do that, you'll discover that they just love the turbulence from your flippers! They'll follow you about the reef for half your dive, entwining about your legs. Much of the time our divers don't realize they have a snake following them around, and on numerous occasions I have come up to a client and relieved him or her of their "guest."

The snakes are wonderful fun, and at the end of two days the initially-terrified guests are shooing the snakes away to take pictures of other subjects.

The other welcoming committee at Marion is a community of sharks that frequent a particular spot we call Action Point. In 1980, *Reef Explorer* took three groups for shark-feeding; the results were spectacular. In each instance we had 10 to 15 gray, silver-tip and reef white-tip sharks come in to feed for our photographers. Everyone managed some great pictures; in one fantastic episode three sharks fought for one fish carcass right in front of our cameras.

When describing trips like these which are filled with giant groupers, sharks, snakes, tuna, rays, turtles, etc., there is a forgivable tendency to neglect the sheer beauty of the reef fish and invertebrates. The pinnacle cities of Marion are like no other diving I've ever seen. The clarity of the water, the vividness of the reef color, the drama of the larger pelagic visitors are a majestic experience for all who come to these remote, virgin reefs. Every dive is a cornucopia of exotic surprises. One dive will yield an octopus, another a giant maori wrasse. There is that quality of awe, of constant discovery on every dive; here a big spider conch, there a clown triggerfish, over there a massive *Tridacna* clam with an iridescent blue mantle. And on every dive, the whipped-cream topping is sharks and snakes that soon become merely extra photo subjects.

This adventure is in truth a personal odyssey for all who experience it. As you can imagine, an exploratory trip of this magnitude is expensive; cruising 1200 miles consumes a lot of fuel. But experiencing a series of remote, unspoiled reefs like these is a supreme lifetime experience. Like diamonds from Tiffany's or your own Mercedes-Benz, it is a special experience that cannot be taken away, something to be cherished for years after. It is an experience a magazine story can never do justice, but one we hope you may cherish.

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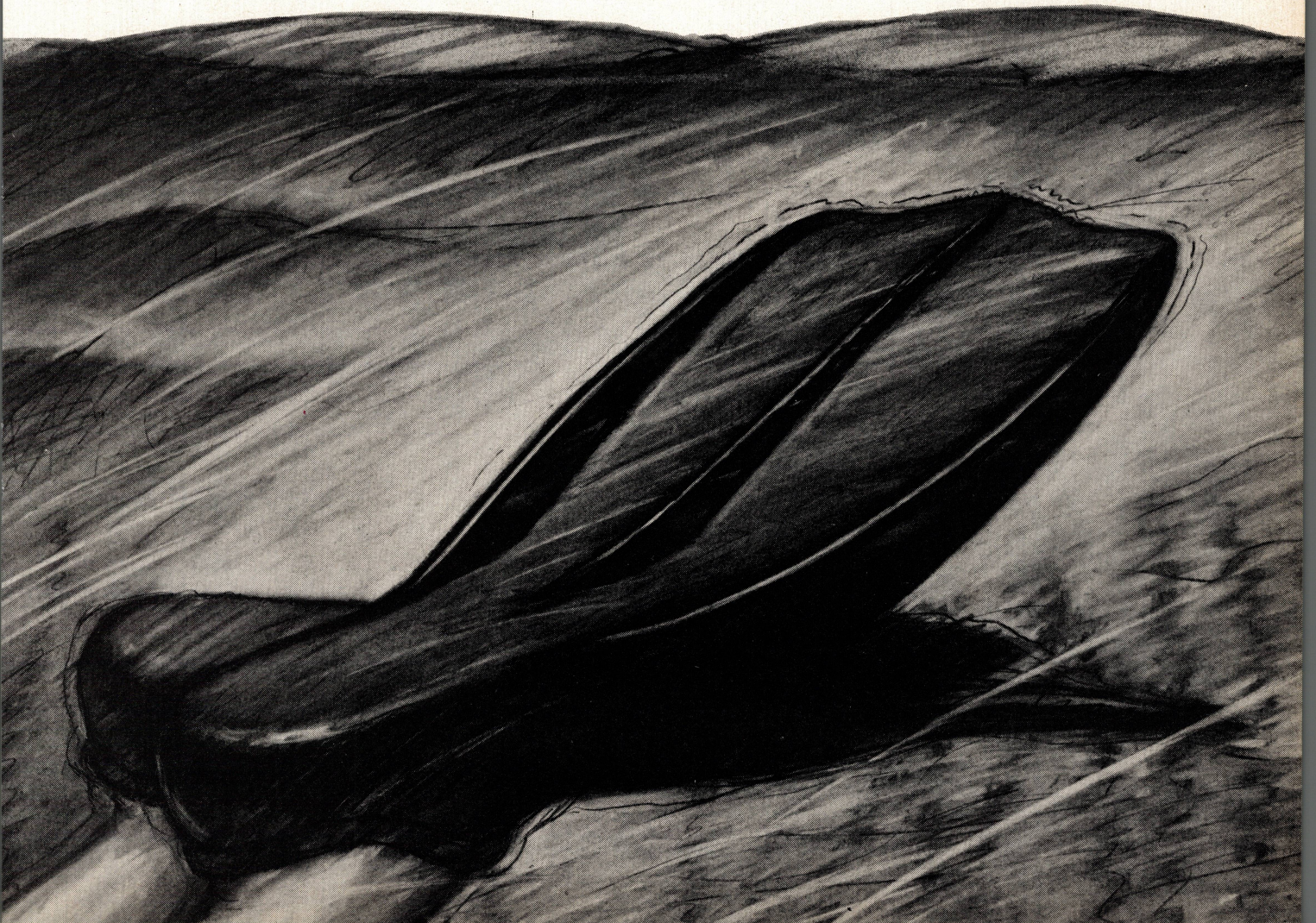
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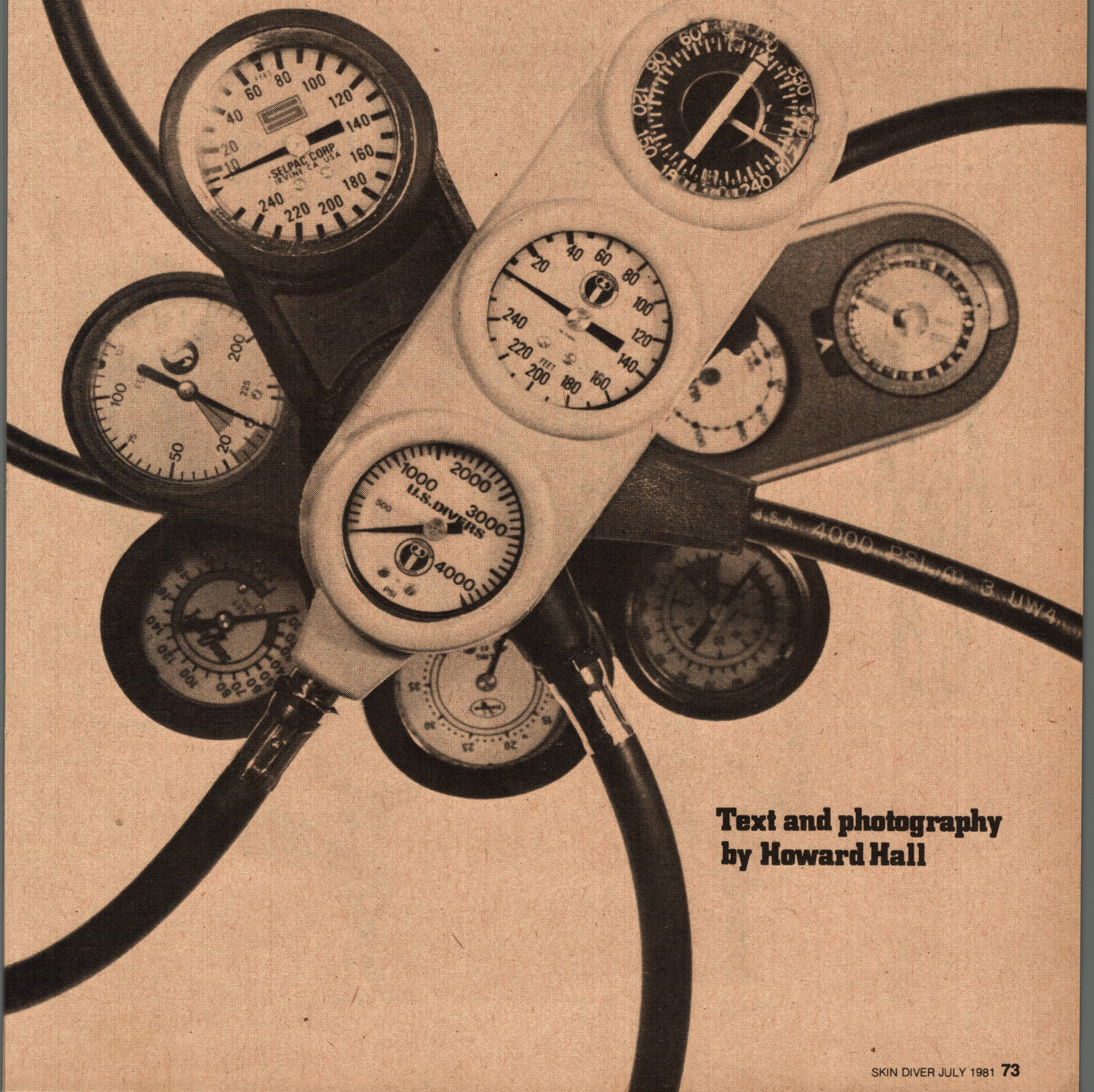
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Telex 40235.


AUSTRALIA

Instrument Consoles



**Text and photography
by Howard Hall**

Instrument Consoles

One of my favorite experiences is a cross country dive through the La Jolla Underwater Park — especially at night. We enter the water at La Jolla Point near La Jolla Cove and swim across the park to La Jolla Shores, one mile away. After entering, we navigate through the ribbon kelp forest at a depth of 30 feet. Then we pass through the palm kelp and beyond to the La Jolla rockpiles in 45 feet of water. After leaving the rockpiles, we navigate across sand until we encounter the La Jolla Submarine Canyon. We descend the

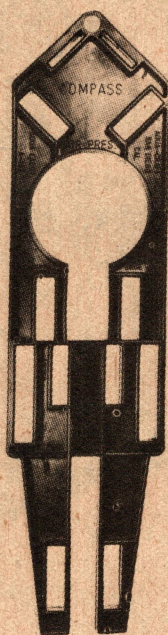
vertical wall to 80 feet and push off into the pitch black water. Once in the mid-water environment, we turn off our lights to better see the illuminated dials of our instruments. As the lights go out, we are swallowed by the black void.

As we swim out away from the canyon wall we are surrounded by billions of tiny explosions of light produced by the plankton disturbed by our movements. We cannot see our hands, our fins, or each other, just a galaxy of green micro stars and the illuminated dials of our instruments. The sudden sensory deprivation plays tricks with us. We feel as if we are alternately being sucked down rapidly into the black abyss, then rushing out of control toward the surface. It seems we are slowly spinning, swimming in circles, or not moving at all. But our concentration is on the dials of our instruments and we know they are accurate despite our sensations. Our

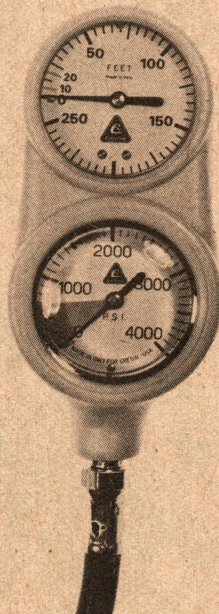
direction is 055 degrees, our depth maintained at 80 feet.

After 20 minutes of darkness, we literally blunder into the opposite wall of the canyon. We switch on our lights and check our decompression meters and pressure gauges. Then we move north along the canyon wall until our air pressure falls to 600 psi. At this time we alter our heading to 090 degrees to move across the sand, through the surf line, and walk out at The Shores. The trip takes us a little over one hour. It is an instrumentation dive — impossible without dive gauges.

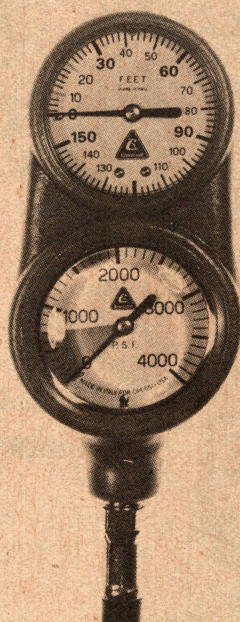
In many ways diving is analogous to flying. In both cases people find themselves in environments for which the human body is poorly suited. Both cases require some life supporting equipment and a way of extending the range of human senses. Instruments provide this extension.



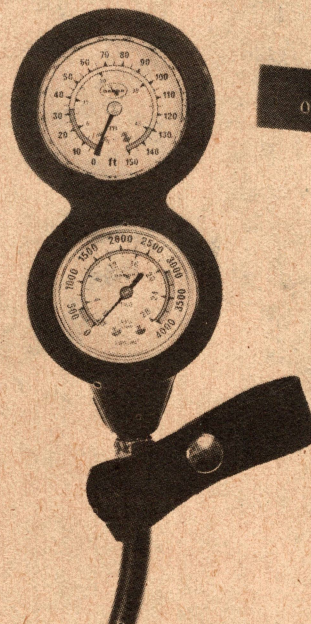
Aqua-Craft, Aqua-Caddy



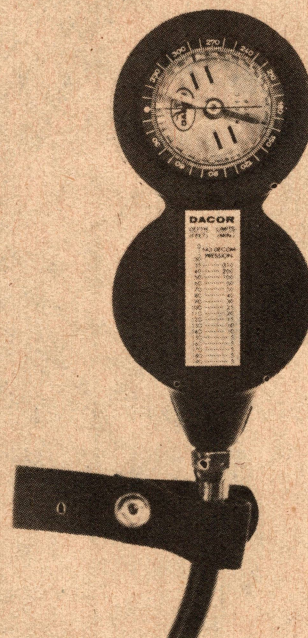
Cressi-Sub, 714



Cressi-Sub, 713



Dacor, IC3150



Dacor, IC3150 (rear)

Of course, you can dive without instruments just as you can fly without instruments, but your capabilities are then severely limited. To safely fly without instruments you must stay within sight of your intended landing field, away from all other air traffic, away from clouds or fog, and you must not fly at night. Most pilots would never consider such restrictions. Even hang glider pilots generally carry variometers and altimeters. A diver without instruments is not much better off.

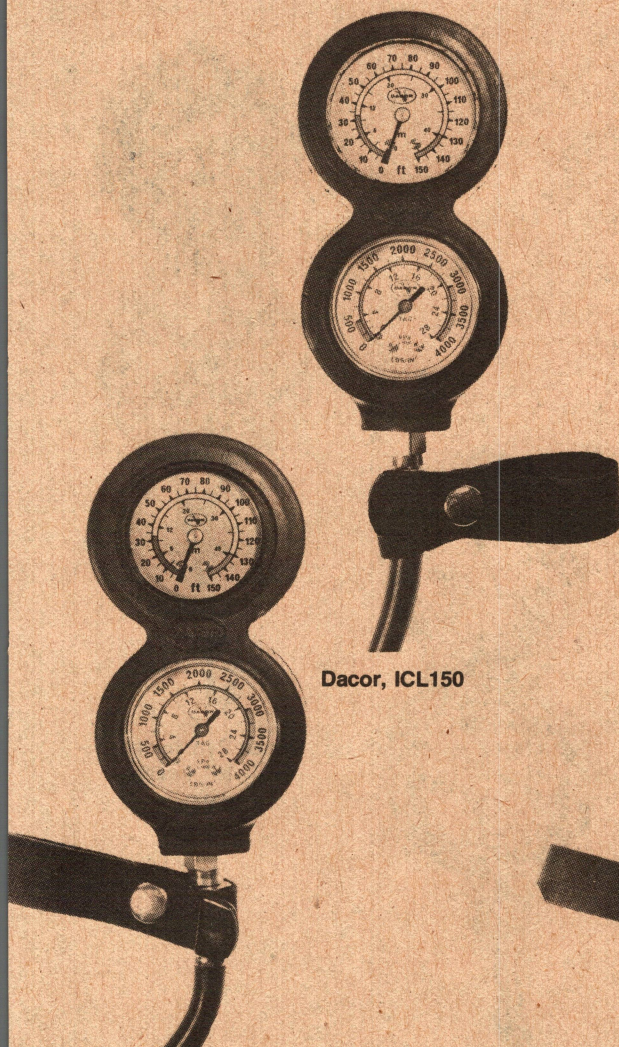
There are four parameters that must be monitored by the diver: 1) air pressure, 2) nitrogen absorption, 3) depth and 4) direction. To neglect any one of these will generally limit a diver's efficiency if not his/her safety. Diving without an air pressure gauge means that one must measure the distance to the surface with every breath. Running out of air is like running out of gas in an airplane. It's

no real problem if the runway is right below you. You just glide in for a landing. But if you're flying over the Rockies, it's a big mistake. If you insist on flying without a gas gauge, you will probably limit your flying far more than the guy who uses the gauge. The same kind of limitations apply in diving.

Diving without monitoring one's depth is equally as dangerous and inefficient. Without a depth gauge, you must know beforehand how deep the bottom will be. This certainly rules out any exploration. Unless you know your depth, you cannot measure your nitrogen absorption, you cannot determine how much air to retain for your ascent and you cannot be certain you have avoided depths where nitrogen narcosis is a major consideration. To compute one's nitrogen absorption one must also carry either a watch, Bottom Timer, or decompression meter. Otherwise one is limited to depths above 30

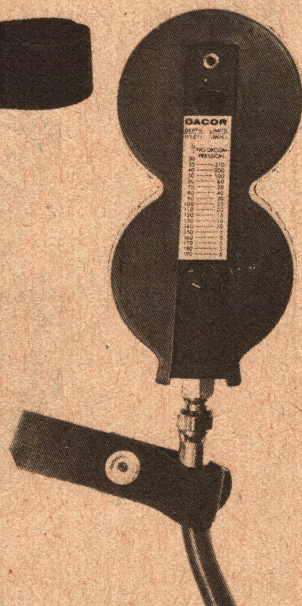
feet. You can forget the old wives' tale about not getting bent on a single tank. At 130 feet, a diver with fair air consumption can stay twice the necessary time to put him in an iron lung or worse. But despite the severity of the consequences, it is shocking how many divers go without these instruments or have no knowledge of how they are used.

Direction is the final parameter. Unless the water is exceptionally clear and there's a prominent topographical feature to navigate along, humans have no sense of direction underwater. Surprisingly though, most divers don't carry a compass and the few who do seldom know how to use it. The inability to navigate underwater is a major limiting factor for most divers. It's the difference a hiker would encounter when crossing a field in a heavy fog as opposed to a clear day. Unless you know how to use a compass underwater, you can't know how lim-



Dacor, ICL150

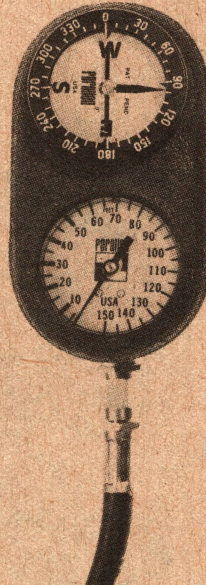
Dacor, ICS150



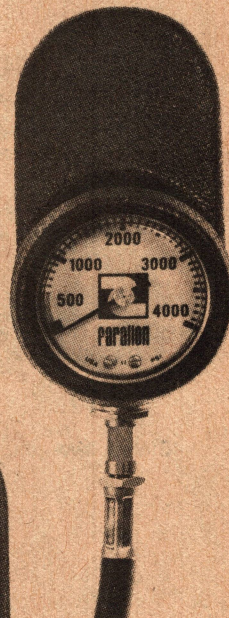
Dacor, No-Decompression Decal
(for all Dacor consoles)



Farallon/Oceanic,
04-1522



Farallon/Oceanic,
04-1530



Farallon/Oceanic,
04-1530 (rear)

Instrument Consoles

ited your diving has been.

Obviously, instruments are an important part of the dive system, just as they are an important part of a flight system. But pilots have one major advantage over divers: They have a dashboard to put the darn things on.

Until instrument consoles were developed, few things were as inconvenient for divers as their gauges. You strapped a depth gauge, watch and decom meter to various parts of your arms while your

body cooked in your wetsuit and your back broke from the weight of your tank. Of course, you could try putting the gauges on before you donned your tank, but with all those gauges you couldn't get your arms through the straps of your backpack.

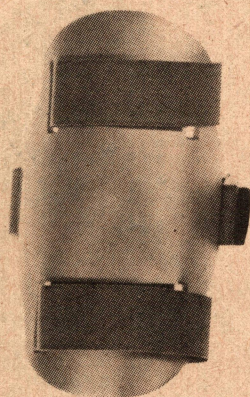
Your frustration was increased when you descended and found that with the compression of your wetsuit, all the gauges had slipped down around your wrists. If you tightened the straps, you would lose the circulation in your hands. When you finally managed to get the straps adjusted, you discovered that they prevented you from reaching into holes for lobster and abalone or were constantly entangled in your speargun line.

For all these reasons and more, wearing gauges on your arms has proven highly inconvenient. And before the development of the console, a surprising

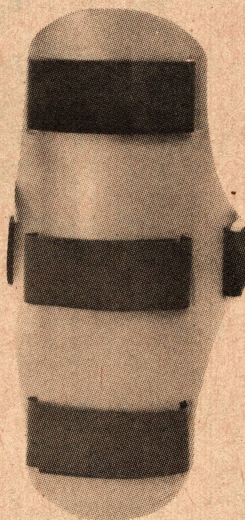
number of divers avoided the problem by simply leaving their gauges on the surface. However, when I saw the first instrument console seven or eight years ago, I was skeptical. Experienced divers tend to resist innovations in equipment because they have grown accustomed to the gear they own. When I saw that first console, I was sure it would only get in the way and cause damage to the fragile instruments. But, because I was an instructor in a retail store, I was obliged to try one. After a month or so of using the unit, I discovered I had been very wrong in my initial evaluation of the console concept. It proved to be one of the most important innovations in sport diving since the rubber mouthpiece.

ADVANTAGES

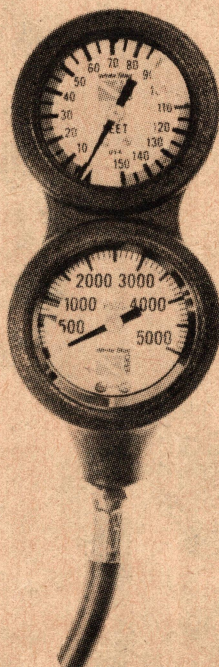
The instrument console as a unit has three advantages over carrying individual gauges. First of all, the console gets



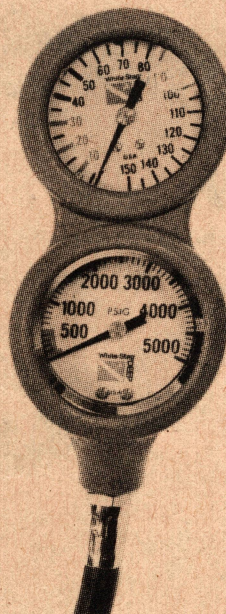
Global, two-gauge



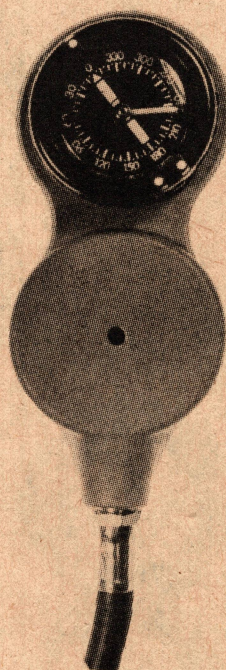
Global, three-gauge



Ocean Dynamics, GC 180



Ocean Dynamics, GCC 181



Ocean Dynamics, GCC 181 (rear)

the gauges off the diver's arm where they are a proven frustration. Second, the console ensures that the diver will carry all his/her gauges on every dive. Without the console it is easy to leave a gauge behind, thinking it unnecessary for a particular dive. Often a diver finds himself/herself in a situation where an instrument is needed or where exploration is limited because the necessary instrumentation is absent. If you own an instrument console, you get used to the idea of always having all of your instruments with you whether you initially feel you need them or not. More often than not, they come in handy.

The third major advantage to the console is that with all of the instruments in one place you can better monitor your dive parameters. When you look at one gauge, you see all of them. Occasionally, when you check your depth gauge, you get a surprise from your pressure gauge.

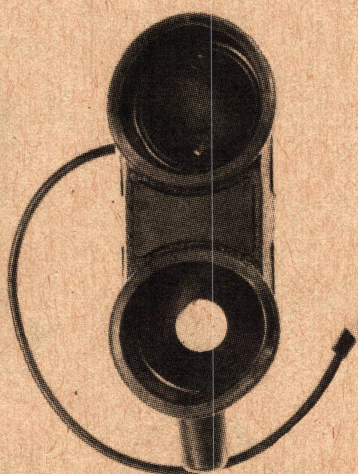
DISADVANTAGES

Disadvantages to the console are more suspected than actual. It would seem that the bulkiness of the unit would cause it to be in the way constantly. Surprisingly, this is not really a problem. The console usually hangs underneath the diver's arm and is seldom even noticeable. Many manufacturers provide retaining straps which allow you to attach the unit to a backpack strap. This seems like a good idea: It prevents the console from banging around underwater and most divers are eager to use it on their first dive. However, releasing it to inspect the console and reattaching it is time consuming. It is usually left unattached after the first dive and the diver discovers it is no more in the way unattached than attached.

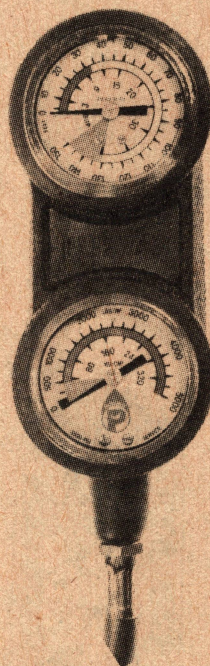
Another potential problem would seem to be instrument damage caused by the console swinging freely underwater and

on the surface. But this too proves to be an unnecessary consideration. The gauges are more likely to be damaged on the diver's arm where they are completely exposed. In the console the instruments are entirely surrounded by rubber or high impact plastic and even though it is dragged across rocks and so forth, the console generally prevents damage to the instruments. I have occasionally had gauges damaged or torn off my arms when I wore them there, but since using a console (during the last seven years) I have not damaged or lost an instrument.

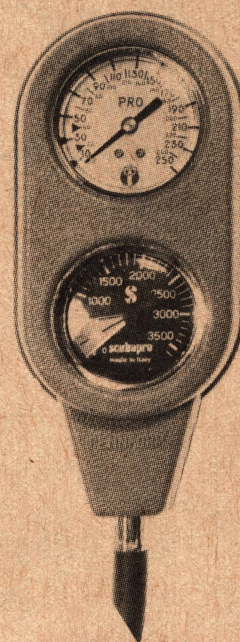
The only possible disadvantage to using an instrument console is the additional strain that the unit places on the pressure gauge swivel. The pressure gauge is attached to the high pressure hose by a small stem which has O-rings on it. As the head of the gauge turns the O-rings sustain some wear. Sooner or



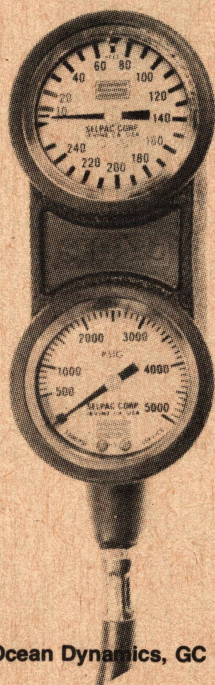
Ocean Dynamics, GCS 1000G



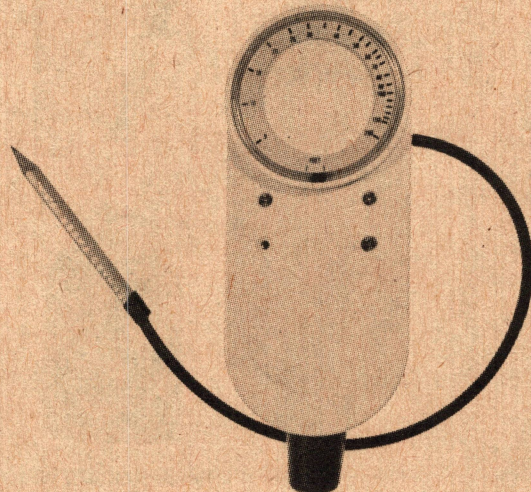
Parkway, 801800



Pennform, 200



Ocean Dynamics, GC 1000



Ocean Dynamics, GCS 1000G (rear)

Instrument Consoles

later the swivel begins to leak and the O-rings must be replaced. Consoles add additional stress to the swivel and some gauges tend to leak sooner with a console than without it. This, however, is an infrequent problem and can be quickly repaired by your local dive store. Certainly, the advantages to the console greatly outweigh this one minor and only potential disadvantage.

THE GAUGES

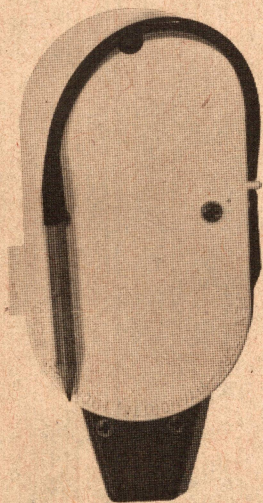
Before going into the differences in

consoles themselves, there is one major overlying consideration when choosing one for yourself. The instrument console is only as good as the gauges it houses. You should satisfy yourself that these gauges are adequate for the diving you intend to do. Perhaps an even better approach is to select the gauges you wish to dive with first, then find a console that accepts them. More often than not, the manufacturer whose gauges you select will have a console for them or a unit that includes these instruments. Although nearly all pressure gauges are similar in design and reliability, the same is not true for depth gauges and compasses. With both these instruments, there is tremendous variation in accuracy, features and reliability. If the manufacturer of the gauges you have chosen does not offer a console for them, there are companies that specialize in making custom consoles.

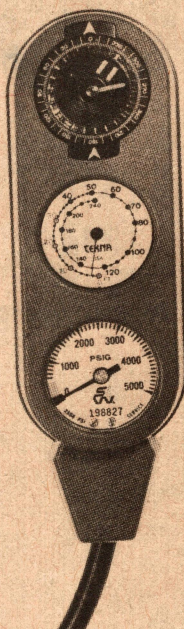
TWO GAUGE CONSOLES

Most instrument consoles are available factory assembled. The majority of these are two gauge consoles consisting of a pressure gauge and a depth gauge. Most manufacturers offer only one pressure gauge model and where other models are available, the only difference is that the scale is metric rather than standard. However, most manufacturers offer a wide variety of depth gauges to fit in their consoles.

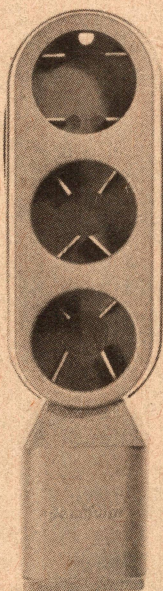
Most of the two gauge units examined were double face consoles, meaning that both pressure gauge and depth gauge are on the same side. There was only one variation from this design. The Farallon/Oceanic back-to-back combo has the depth gauge attached to the back of the pressure gauge. This design minimizes the length of the unit, but necessitates turning the console over to read both gauges. Farallon/Oceanic



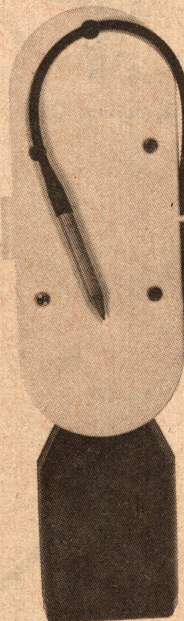
Pennform, 200 (rear)



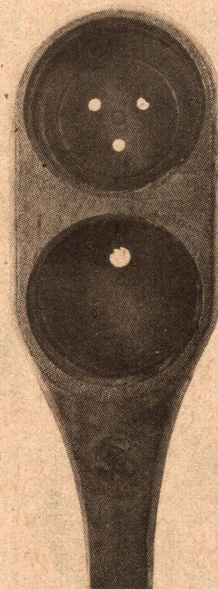
Pennform, 300



Pennform, 320



Pennform, 320 (rear)



Scubapro, 28-013-000

makes a double face version of the console as well.

The designs of the various two gauge consoles are remarkably similar, and other than the differences in the gauges available in them, there is not much to say for their diversity. The Tekna and Sherwood models have one minor, but useful, design variation worth noting. The gauges are tilted toward each other about 15 degrees, allowing easier simultaneous reading.

For those who already have a pressure gauge, most manufacturers of two gauge consoles offer the boot of the unit separately. By purchasing a boot and a specific depth gauge, you can up-grade your system to a dive console.

THREE GAUGE CONSOLES

There is more diversity in three gauge consoles than in two gauge designs. The

third receptacle is generally meant for a compass and it is usually located on the end of the unit or on the back of what otherwise would have been a two gauge console. The three face design is longer and therefore slightly more cumbersome, but all three gauges can be read at one glance. The back-to-back three gauge console is certainly more compact, but necessitates turning the console over to read one instrument. There is one exception to these designs, however. Sub-Aquatic Systems' (SAS) three gauge unit is a triangle. This has a certain advantage.

When you read a compass, it is necessary to position your body along the lubber line so that your direction of movement or intended movement follows the direction of the line. Most linear three gauge consoles are assembled with the lubber line pointing in line with the three gauges. This arrangement is slightly in-

convenient because the pressure gauge hose restricts the holding of the console in line with the body's movement.

With the SAS console, however, one corner of the triangle and the lubber line point easily in the desired direction when held in front of the diver.

Some linear three face units are shipped with the lubber line running 45 degrees to the left of the line of the console which significantly improves their function. Other linear consoles can be modified in the same manner. And if you are having your console assembled by your dive store, ask that the compass be positioned to point left of center.

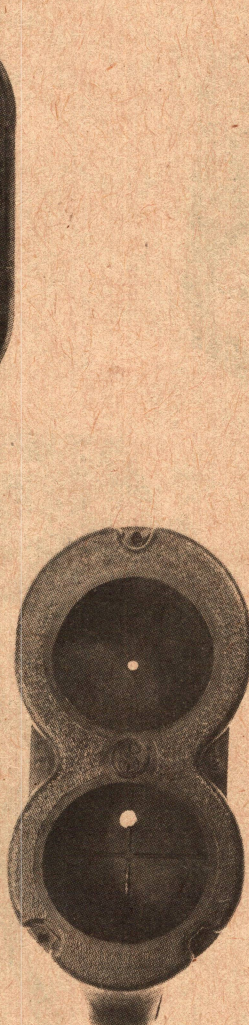
ACCESSORY MOUNTS

Many of the two and three gauge consoles available today have accessory brackets for mounting additional gauges with a strap. Several of the two gauge units have slots or grooves to allow strap-

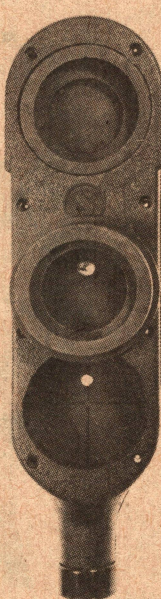


Scubapro,
28-020-000

Scubapro, 28-021-000



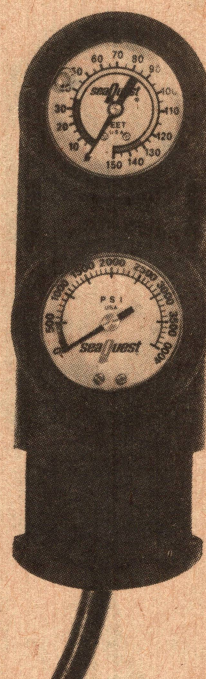
Scubapro, 28-528-000



Scubapro,
28-529-000



SeaQuest, 8000



SeaQuest, 8002

Instrument Consoles

ping either a compass, watch, Bottom Timer, or decompression meter to the back (see chart). The presence of this bracket is not exceptionally obvious in some consoles and you have to look for it. In other two and three gauge units, the bracket is very prominent. Since no console is available with a watch or a decompression meter, an accessory bracket is a useful feature allowing you to add one of these necessary instruments to your console. The SeaQuest two gauge console has accessory brackets for two additional gauges permitting even further modification.

The SAS and Pennform three gauge consoles have large mounting brackets for attachment of the Scubapro decompression meter. This bracket can also be used for a watch or Bottom Timer. The design of the Scubapro three gauge unit allows for the mounting of the meter on the back of the console.

If you choose a console which doesn't have an accessory bracket, it may be possible to attach an additional gauge anyway. However, without a specific design accommodating the attachment of the strap, you may find that it can work its way loose underwater and fall off, or that the gauge strap obscures the reading of the other instruments.

ACCESSORIES

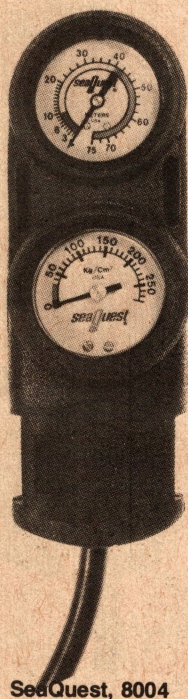
There are some interesting accessories available on some instrument consoles. Tekna has a two gauge console with a locking holster on the back for a

small, seven inch, low profile knife. Like instruments, knives are one of the things that divers sometimes find awkward to carry. The Tekna design provides a knife that is entirely out of the way and yet always there when you need it.

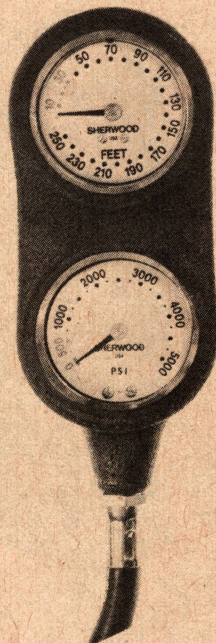
All Dacor consoles come standard with a small, convenient no-decompression table on the back. In addition, there is a strap-on slate with an attached watertight compartment for a non-waterproof watch or compass.

The Ocean Dynamics two gauge units have an accessory slate with the option of an attached capillary depth gauge, compass, or capillary depth gauge/compass combination.

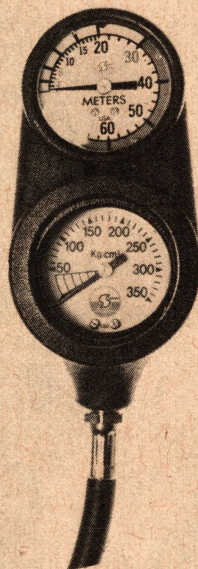
Many manufacturers offer slates as optional accessories. And, the console is an ideal place for carrying a slate since it requires very little space. U.S. Divers' compact three gauge console has a slate on the back, a standard feature.



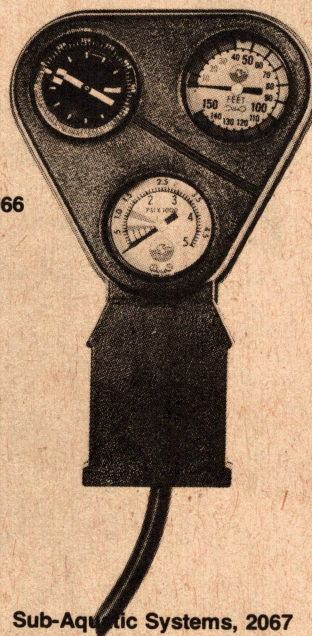
SeaQuest, 8004



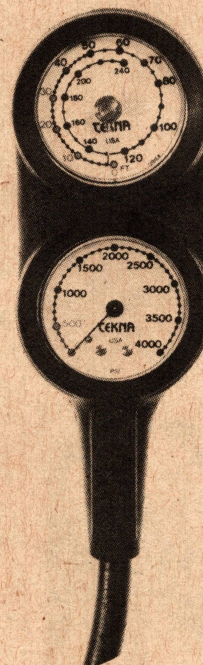
Sherwood, GC 250



Sub-Aquatic Systems, 2066



Sub-Aquatic Systems, 2067



Tekna, T-2710

INSTRUMENT CONSOLES

MANUFACTURER/ MODEL	CATALOG NUMBER	PRESSURE GAUGE	DEPTH GAUGE	COMPASS	SLATE	NOTES	PRICE
AQUA-CRAFT Caddy	A-183	AAM	AAM	AAM	AAM	An SPG bracket w/straps.	\$ 11.95
CRESSI-SUB Combo 150	713	Cressi	Cressi	None	No	FA, available in blue or orange.	\$112.00
Combo 250	714	Cressi	Cressi	None	No		112.00
DACOR							
	ICB	*	*	No	Optional	FA, with any combination of Dacor	\$ 12.00
	IC3150	Dacor	Dacor	Dacor	No	gauges. One has optional compass.	135.00
	IC3300	Dacor	Dacor	Dacor	No	Back of console has a no-decom.	135.00
	ICL150	Dacor	Dacor	No	Optional	chart. MGA in ICL series.* ICB is an	120.00
	ICL300	Dacor	Dacor	No	Optional	empty console for Dacor gauges.	120.00
	ICS150	Dacor	Dacor	No	Optional		112.00
	ICS300	Dacor	Dacor	No	Optional		112.00
FARALLON/OCEANIC							
150 Back to Back	04-1510	F/O*	F/O	No	No	FA. Black only. MGA.	\$130.00
250 Back to Back	04-1511	F/O	F/O	No	No	*F/O =Farallon/Oceanic.	130.00
200 Back to Back	04-1512	F/O	F/O	No	No		138.00
150 Double Face	04-1520	F/O	F/O	No	No		130.00
250 Double Face	04-1521	F/O	F/O	No	No		130.00
200 Double Face	04-1522	F/O	F/O	No	No		138.00
150 Navigator	04-1530	F/O	F/O	F/O	No		168.00
250 Navigator	04-1531	F/O	F/O	F/O	No		168.00
200 Navigator	04-1532	F/O	F/O	F/O	No		176.00
GLOBAL MFG. Three Gauge		No	AAM	AAM	No	An arm bracket for gauges.	\$ 16.00
Two Gauge		No	AAM	AAM	No		14.00
OCEAN DYNAMICS							
	GC1000	OD*	OD	Optional	Optional	FA, available in black or blue. The	\$ 93.00
	GCS1000G	OD	OD	No	Yes	GCS1000GT has a thermometer on	105.00
	GCS1000GT	OD	OD	No	Yes	the slate. Empty console for OD	115.00
	GCS1000C	OD	OD	OD	Yes	gauges available.	125.00
	GC180	OD	OD	No	No	*OD =Ocean Dynamics.	100.00
	GC181	OD	OD	No	No		95.00
	GCC180	OD	OD	OD	No		120.00
	GCC181	OD	OD	OD	No		120.00
PARKWAY FABRICATORS							
	801800	Parkway	Parkway	No	No	Gauge faces marked in both metric &	\$105.00
						standard.	
PENNFORM PLASTIC PRODUCTS							
	300	AMM	AMM	AMM	Optional	UA, w/o gauges. Order to fit your	\$- 17.95
	320	AMM	AMM	AMM	Optional	gauges. Available in four colors.	20.95
	200	AMM	AMM	No	Optional	Accessories available.	16.95
SCUBAPRO							
	28-529-000	Scubapro	Scubapro	Scubapro	No	UA w/o gauges, except for 28-020 &	\$ 32.50
Compact	28-528-000	Scubapro	Scubapro	No	No	28-021. Three gauge models do not	25.00
Two Gauge	28-013-000	Scubapro	Scubapro	No	No	accept capillary depth gauge. Acces-	12.00
Two Gauge	28-020-000	Scubapro	Scubapro	No	No	sory bracket for decom meter avail-	160.00
Two Gauge	28-021-000	Scubapro	Scubapro	No	No	able w/28-529.	164.00
SEAQUEST							
	8000	SeaQuest	SeaQuest	No	No	FA. Brackets allow for 2 additional	\$133.90
	8002	SeaQuest	SeaQuest	No	No	gauges. Empty console for SeaQuest	133.90
	8004	SeaQuest	SeaQuest	No	No	gauges available. 8004 is metric.	133.90
SHERWOOD	GC250	Sherwood	Sherwood	No	No	FA	\$120.00
SUB-AQUATIC SYSTEMS							
Two Gauge	2066-C	SAS*	SAS	No	No	FA, except for UC-200 and UC-300	\$140.00
Two Gauge	2066-B	SAS	SAS	No	No	which are empty consoles. Three gauge	150.00
Three Gauge	2067-C	SAS	SAS	Yes	No	consoles have optional decom	180.00
Three Gauge	2067-B	SAS	SAS	Yes	No	meter or watch bracket. MGA	200.00
Two Gauge	UC-200	AMM	AMM	AMM	No	*SAS =Sub-Aquatic Systems.	20.00
Two Gauge	UC-300	SAS	SAS	No	No		14.50
TEKNA							
	T-2800	Tekna	Tekna	No	No	FA. T-2800 and T-2810 have knife on	\$169.95
	T-2810	Tekna	Tekna	No	No	back. Black knife is \$5 extra. MGA	174.95
	T-2700	Tekna	Tekna	No	No		134.95
	T-2710	Tekna	Tekna	No	No		139.95
U.S. DIVERS							
Divemaster I	7414	U.S. Divers	U.S. Divers	No	No	FA, available in four colors.	\$147.00
Divemaster III	7418	U.S. Divers	U.S. Divers	U.S. Divers	No	MGA.	187.00

AAM—Accepts any model
 AMM—Accepts most models
 FA—Factory assembled
 UA—Unassembled
 MGA—Metric gauges available

Instrument Consoles

CUSTOM CONSOLES

Most dive equipment manufacturers offer consoles with only a limited selection of their own gauges. Many of these manufacturers also offer the console boot for those who already have their pressure gauge and would like to move up to a console when they buy a depth gauge or other instruments from the same manufacturer. But for those who already have gauges made by a variety of manufacturers, there are several ways to consolidate these into a console.

Pennform was first to come out with an

equipment console. Then, as now, Pennform does not make instruments, only console boots. Over the years they have developed several two and three gauge designs which are available for nearly any combination of major dive equipment manufacturers' gauges. You simply specify the gauges you own when you order your console. The company also makes a variety of console accessories including retaining straps, slates, and cover-up bags.

SAS also makes consoles that will accept a wide variety of other manufacturers' instruments as well as its own.

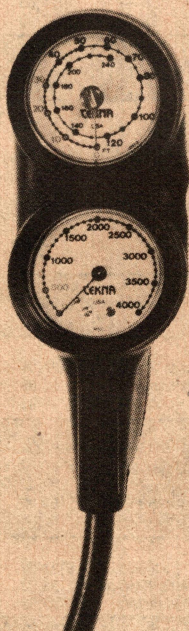
ALL PURPOSE CONSOLES

Aqua-Craft and Global make instrument consoles that are considerably different. The Aqua-Craft Caddy is a plastic bracket that can be strapped to any pressure gauge and to which can be

strapped a considerable number of other gauges of any design. What the Caddy lacks in compactness and aesthetics, it more than makes up for in versatility.

Global has approached the problem of carrying dive gauges in an entirely different manner. It has the only console that does not attach to the pressure gauge. Its device is a plastic sleeve which straps to the diver's arm and has velcro straps for attaching two or three additional gauges (depending on the model). For those of you who still don't like the idea of your gauges bouncing around on the end of your pressure gauge hose, this is a practical alternative.

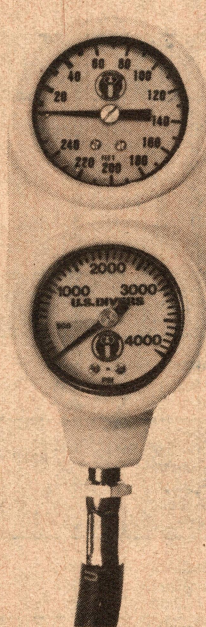
Instruments are an essential part of a diver's life support system. And, the instrument console makes full instrumentation on every dive convenient and practical, greatly extending the limits of a diver's senses and capabilities. »



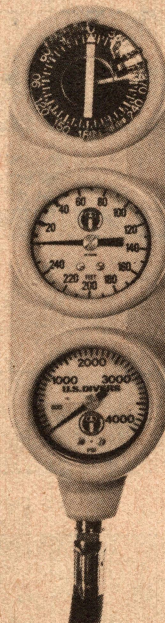
Tekna, T-2810



Tekna, T-2810 (rear)



U.S. Divers, Divemaster I



U.S. Divers, Divemaster III



U.S. Divers, Divemaster III (rear)

A Trilogy of New Dive Lights

**Underwater Kinetics
3000, 3500, 4500**



Text and Photography by George Cozens

From the company that brought us the Super-Q light comes a new series of larger dive lights that should also prove to be very popular. The company is Underwater Kinetics, and the new lights (designated by the model numbers 3000, 3500, and 4500) are an example of this company's dedication to scientific research, efficient design, and quality construction.

During the latter part of 1980, Underwater Kinetics produced a new, medium-size, reasonably priced dive light called the SE200. This light used a heavy duty six volt lantern battery for its power source because this type of battery has a good energy capacity, a low cost, and is available almost anywhere. The rest of the light's components were then designed around the lantern battery to yield a high performance dive light. The result, the SE200, was compact and lightweight, with a bright

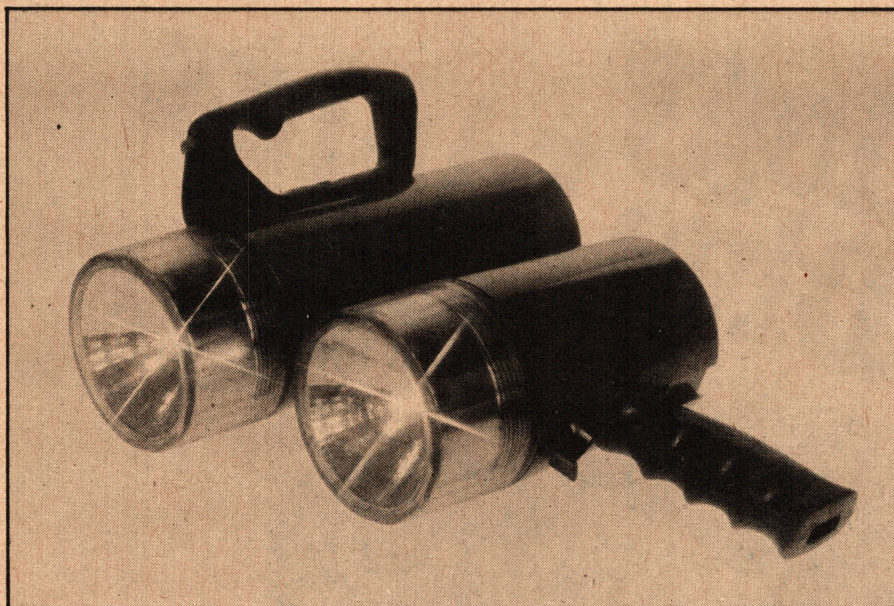
beam, a good beam coverage and reasonable burn time.

The manufacturer, however, was not content to stop here. Listening to comments from both sport and commercial divers in the field, and conducting additional testing and research, Underwater Kinetics was able to refine the light's performance even more.

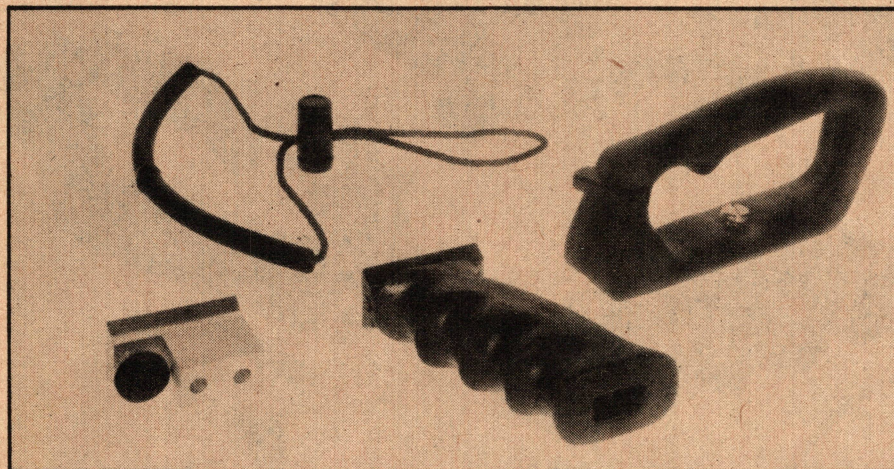
The new Series 3000, 3500 and 4500 dive lights are the culmination, to date, of their effort to produce high performance, lantern battery powered dive lights. The Series 3000 (powered by a six volt rechargeable gel-cell) and the Series 3500 (powered by a disposable six volt) are almost identical in appearance to their predecessor, the SE200. The Series 4500, a 12 volt light, is similar in appearance, but with an elongated case (which houses two disposable six volt lantern batteries in tandem). As with the SE200, the cases of these newer

lights are made of impact resistant ABS plastic, and the ports are clear Lexan. These lights can be purchased with one of two handle types; the original pistol grip or the iron grip. The pistol grip is available on lights with catalog numbers 3000, 3500, and 4500. This handle mounts in a dovetail groove in the case and can be secured anywhere along this groove to balance the light or to make operating the switch more convenient. The new iron grip (bucket type) is available on lights having catalog numbers 3001, 3501, and 4501. This handle also fits in the dovetail groove, and allows the light to be carried comfortably at the diver's side.

Subtle but important changes were made in the reflector. No longer smooth, the new reflectors are composed of many small, flat, highly reflective surfaces, that when viewed together approximate a parabolic shape.



Above, the Underwater Kinetics Series 4500 (bucket handle) and the Series 3500 (pistol grip). Below, options for the lights include pistol or bucket handles, lanyard and tripod mount.



In addition to this new shape, the faceted reflectors have a harder, more temperature-resistant, reflective coating. Besides being more resistant to corrosion and pitting, this coating has allowed the use of more efficient, higher temperature bulbs (custom-made for Underwater Kinetics). According to the manufacturer, the brighter, faceted reflector and higher temperature bulb combination produce a more even beam (i.e., reduced hot spots and shadows), with an increase in light output of about 50 percent.

The switch mechanism on the new lights is the same as that on the older SE200. A solid, O-ring sealed shaft, which penetrates the case, has a stainless steel cam plate attached to its end. As this cam is rotated, it causes two stainless tabs to make and break contact. On lights with pistol grip handles, the switch control is a V shaped knob that can be operated with the index finger of the hand that is holding the light. On lights with the iron grip, the shaft

is extended up into the handle, terminating in a rocker type switch control easily reached with the thumb. Both types of handles, therefore, provide one-handed operation — with either hand.

One criticism I have heard about these dive lights is that the two tabs (switch contact points) on the reflector assembly can get bent out of position, and, consequently, prevent the light from operating. True. These tabs are made of a relatively soft stainless steel and are reasonably easy to bend. In fact, they are intentionally made of softer stainless so that they can take the repeated bending action of the switch cam, and be readjusted occasionally by the diver, without becoming brittle and breaking. Although these tabs are fairly well protected, reasonable care should be exercised in handling the reflector assembly to prevent these tabs from getting bent out of shape. After reassembling the light, and prior to use, it would be wise to check it for proper operation,

and also, to visually inspect the O-ring seal through the clear lens.

Some divers have complained about the switch not working after reassembling the light, placing the blame on those two stainless tabs. In many cases, however, those tabs were not at fault. Instead, the lens was not screwed down tightly. If the lens is loose, the switch may not make contact when turned on, and, more important, the O-ring may not seal, thus inviting a leak. If the light won't function, check the lens for tightness. A blessing in disguise? Perhaps. And speaking of leaking — it should be comforting to know that practically all of the materials inside (battery excluded) and all the materials outside the light are made of corrosion-resistant materials — primarily stainless steel and plastic.

Keeping the lens screwed down tightly is not recommended all the time, however. Most people know that it is not recommended to leave disposable batteries in lights for long periods of time because of battery acid corrosion. Rechargeable batteries may not leak, but they can outgas with time, especially if heated. For this reason, a tightly sealed light should not be left too long in direct sunlight, or in the hot trunk of a car. Also, to avoid excessive internal pressure, consider unscrewing the lens a little, to break the airtight seal, during air travel.

To increase the versatility of these lights, Underwater Kinetics also produces a few accessories: a tripod mount (Catalog No. 03-1103, \$10); three chargers for the Series 3000 light (one comes with the light, but one or both of the remaining two may be desirable options — 110 volt AC, Catalog No. 03-1104, \$10, if purchased separately/220 volt AC No. 03-1105, at \$15/and 12 volt DC No. 03-1106, \$6); an adjustable wrist lanyard (braided nylon with a neoprene sleeve and a locking, Lexan slide, Cat. No. 02-1022 or 02-1023, \$3). Note: In my own opinion, I feel these lanyards are useful topside, but for underwater use I would suggest one with more give (stretch) — so if your light gets jammed in a hole, or wherever, you would be able to pull your hand free, and not be handcuffed to the imprisoned light.

Overall, I'm impressed with these lights: they are reasonably compact, and not too heavy; provide a very bright, even beam with good beam width; have a sufficiently long burn time; and are powered by inexpensive, readily available batteries (at least the Series 3500 and 4500). The lights are versatile, with different handles to meet different applications, and, depending on what power is available, can easily be changed from non-rechargeable to re-

(Continued on Page 118)

SDM travel

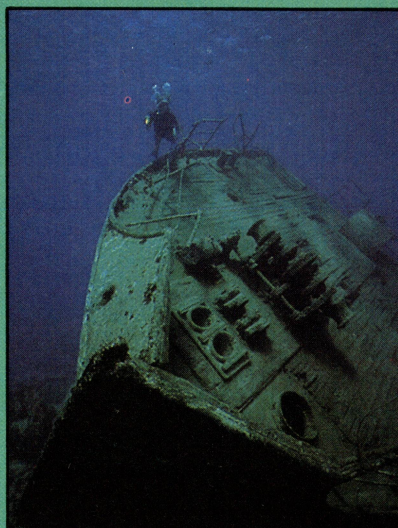
SECTION

The *Cartanser Senior* is one of the most popular underwater attractions of St. Thomas. It is frequented on a daily basis by scuba divers, snorkelers and glass bottom boat sight-seers, who thrill to the eerie vision of a sunken ship on the ocean floor only 50 feet below. Yet, the history behind the sinking of the *Cartanser Senior* is perhaps one of the most bizarre stories of politics and conservation you are likely to hear. This vessel has been the focal point of a ten year saga about ship salvage.

In 1970, a WW II vintage steel freighter came limping into St. Thomas Harbour from somewhere in Latin America. The 190 foot cargo vessel was carrying very little except for a pile of cement bags in the rear hold. Cloaked in mystery and confusion, the *Cartanser Senior* was abandoned at the dock by its captain and crew. There were rumors of a dispute with the vessel's owners over wages.

The old ship was eventually towed to a backwater cove in Gregorie Channel, away from the busy shipping lanes leading into the center of the harbor. Alone and unattended, the rusting derelict was frequently boarded by unauthorized visitors who pilfered small tools, machine parts and other tempting souvenirs. In the process, someone removed a through-hole fitting which started a slow leak. The *Cartanser Senior* gradually filled with seawater and sank to the bottom of St. Thomas Harbour.

For several years the ship remained untouched and unnoticed by anyone. It was lying in thick silt on the bottom and cloaked in murky water. Divers seldom ventured there because of the poor visibility. The ship was of no interest or value to anyone and simply sank into obscurity. In 1975, the production company making a Hollywood epic called *The Deep* was searching for an appropriate filming site. The crew decided upon the *Rhone*, in the British Virgin Islands just



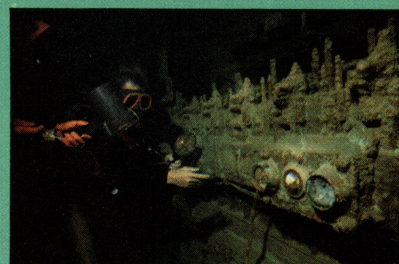
CARTANSER SENIOR

The Ship That Sank Twice

By Geri Murphy

a few miles from St. Thomas. This incident struck a spark with Win deLugo, director of the Virgin Islands Film Promotion Office. He put together a proposal for placing a wreck at Little Buck Island where the underwater visibility and sea conditions are perfect for diving and photography. If St. Thomas had a shipwreck at this location, the Virgin Islands would be able to attract television crews and movie companies to the island for underwater production work. Pat Boatwright, a commercial diver in St. Thomas, suggested the *Cartanser Senior* would be perfect as an underwater set for shipwreck movies. It was just the right size, still in good condition, and could be easily moved with the right kind of salvage equipment.

Meanwhile, the Army Corps of En-



photos/Geri Murphy

gineers was engaged in a project to help clear St. Thomas Harbour of old shipwrecks, junk and other obstructions that might be a hazard to navigation. The Corps of Engineers had done a survey of the area and had contracted a private salvage company to cut up and remove all unwanted scrap lying on the bottom. By 1978, the salvage project was well underway and the *Cartanser Senior* was earmarked for the scrap yard. Win deLugo began recruiting local support to prevent the scrapping of a shipwreck and the end of his dream of a Hollywood movie. SKIN DIVER Magazine was invited to examine the shipwreck and give its opinion in the matter. Pat Boatwright and publisher Paul Tzimoulis made a thorough underwater survey of the ship and de-

Invitation to tender for the Deep Water Activities at the Hurghada Sheraton Hotel Red Sea, Egypt

Operating companies with expertise in deep water activities are invited to tender for the facilities at the Sheraton Hotel, Hurghada, Red Sea, Egypt.

I Operator will establish a diving base school at the Sheraton Hotel in Hurghada, Egypt, and commits himself to the following services and conditions:

a) Will provide and finance all the necessary equipment and materials for twenty divers. The materials should be in Hurghada eight weeks after signature of contract. Material will include one compressor, type K14, alternatively for diesel and/or electricity; one decompression chamber; flood lights for night diving, etc.

b) Will have a resident professional Dive Instructor with fluent knowledge of English and German languages, plus one dive assistant.

c) Dive Master will train two local boys as dive assistants and gradually teach them to become fully experienced dive masters. All personnel at the diving school will be employees of the Operator and not employees of the Hotel.

d) If the number of divers should require a second Chief Dive Master at a later stage, Operator is committed to provide such a person.

II Sheraton Hotel Management will provide the following facilities to Operator:

a) Dive Masters shall be provided with free lodging and food. The Chief Dive Master will be allowed the same conditions for his wife.

b) Dive Masters are granted 25% discount on their consumption at the bar.

c) Sheraton will provide space for Dive Shop (to store the materials) with a minimum of twenty square meter surface. It will also provide an adequate installation for the compressor (Operator will supply lay-out drawing for compressor and maintenance station).

d) Sheraton will provide a suitable boat for diving. A rate of US\$5.00 will be charged for each diver and for each diving excursion. The minimum daily rate to be paid to Sheraton by Operator for each diving day will be US\$20.00 even if there are less than four divers that certain day. In the event of bad weather conditions or non-diving activity on one day, this rate will not have to be paid. The rate of US\$5.00 is not applicable on dive masters and crew.

III Diving rates are settled in agreement between Operator and Sheraton Hurghada. Operator will submit a list of today's prices for diving activities, according to the experience in other diving resorts.

IV All funds paid on account of the diving centre will be collected by the hotel directly from the clients. The hotel management will organize the most convenient system to do so.

V The clearing of debits and credits is made monthly by invoice, at latest by the fifth of each month. All payments are due in US\$ (dollars).

VI The Chief Dive Master shall not interfere with the Management of the Hotel.

VII The Management of Sheraton has the right for good cause to require replacement of Dive Masters or other employees after notice to Operator.

VIII Sheraton is not responsible for any accidents during the hours clients spend in diving activities and Operator will so indemnify Sheraton. Operator shall obtain and pay for an insurance policy covering civil liability for their divers, which policy will be in amounts satisfactory to Sheraton and will include Sheraton as insured.

IX Sheraton guarantees Operator the exclusivity of all diving activities at their Hurghada Hotel/resort.

X Operator will have to submit evidence of his marketing capabilities to promote the Hurghada Sheraton Diving Centre.

A contract will be executed for a minimum term of three (3) years.

If for good cause one of the parties elects to cancel the contract then notice to the other must be given in writing, with full justification of the reason and with a six month notice, six months in advance of such termination and setting forth the justification for the termination.

Termination can only take place at the end of each season, which means end of April and end of October.

Operator will supply and pay for all the above mentioned equipment CIF Cairo Airport and Sheraton will provide the necessary import license and pay any kind of eventual duties and import taxes as well as provide the transportation of the mentioned equipment from Cairo Airport to Hurghada Sheraton Hotel.

Any interested applicants pursuing this position contact the General Manager at the Hurghada Sheraton Hotel, Hurghada, Red Sea, Egypt.

Hurghada Sheraton Hotel
فندق شيراتون الغردقة

CARTANSER SENIOR

clared to be a valuable resource for future dive tourism. Tzimoulis reported the wreck would be worth millions to the economy of St. Thomas, if it could be moved to the cleaner waters of Buck Island and preserved as a marine life sanctuary. At this point, the battle to save the *Cartanser Senior* really warmed up and there was a great deal of newspaper coverage and proposals for government action. Unfortunately, the wheels of bureaucracy were grinding slowly toward the eventual end of the *Cartanser Senior*.

At the Eleventh Hour, the *Cartanser Senior* won a reprieve. A fire in St. Thomas Harbour burned and sank a luxury cruise ship called the *Angelina Lauro*. The great ship had to be removed from the harbor quickly and the insurance company hired a giant 800 ton Super Crane for the salvage job. The owners of the crane, Neptune Transport & Services, agreed to assist in the moving of the *Cartanser Senior* for basic labor costs — \$39,000. But, the Virgin Islands government did not have the money available at the time.

In a last minute desperation effort, a group of five private St. Thomas citizens borrowed the money to pay the salvage crane costs for the moving of the *Cartanser Senior*. This group included: Dick Doumeng, Bill Evans, Mark Marin, Wy-dell Robbie and Win deLugo.

On July 16, 1979 the *Cartanser Senior* was given a new home and, hopefully, a new career in the underwater movie business. Over a two day period, the ship was raised to the surface by the Super Crane and towed five miles to a protected cove on the west side of Little Buck Island. Then the ship was gently lowered to the sea floor 50 feet below. She lies next to a colorful coral reef. The man smiling the most was Win deLugo, who had worked for almost five years to get the shipwreck moved.

Today, the wreck of the *Cartanser Senior* has become the single-most popular dive attraction of the U.S. Virgin Islands. Everyday, dive boats anchor above this lovely wreck and divers by the dozen descend for a view of this little ship lying in crystal clear water. In the short time that it has been at Little Buck Island, the *Cartanser Senior* has already attracted a large community of marine life. Schools of fish hover over the bow section and large pelagics make regular visits. While the *Cartanser Senior* has not yet become a Hollywood movie set, it is already a star to the thousands of divers who visit the Virgin Islands every year.

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for more information circle #126 on Reader Service Card

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\$ **41⁵⁰** per person
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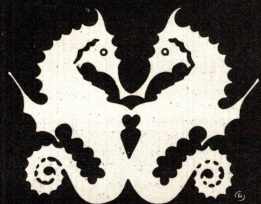
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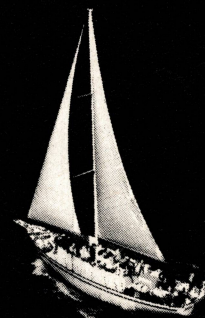
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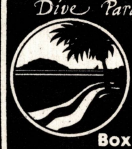
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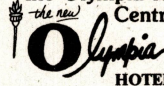
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In addition to *Falling Star*, the Dive Bonaire fleet consists of three other flattops, *Moonshadow*, *Windsong*, and *Rising Tide*; a 31 foot cruiser, *Horizons*; and *Sea Scape*, a glass-bottom boat.

Further information can be obtained by calling toll free (800) 847-7198, or writing via airmail to Dive Bonaire, c/o the Flamingo Beach Hotel, Bonaire, Netherlands Antilles. 🐠

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CRAWFORD TO VALENTINE'S

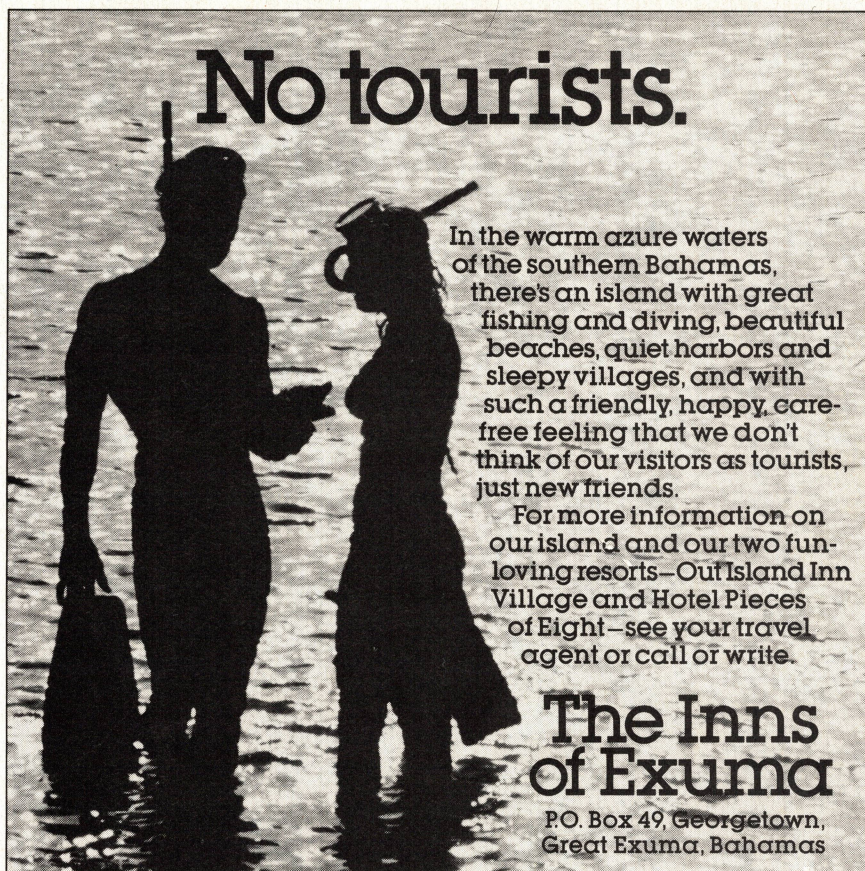
Captain Bill Crawford, formerly of Tropic Isle Dive Shop in Key Largo, has been named the new manager of Valentine's Dive Center on Harbour Island, Bahamas. Mr. Crawford has over ten years' experience in dive shop and charter boat operation in the Florida Keys.

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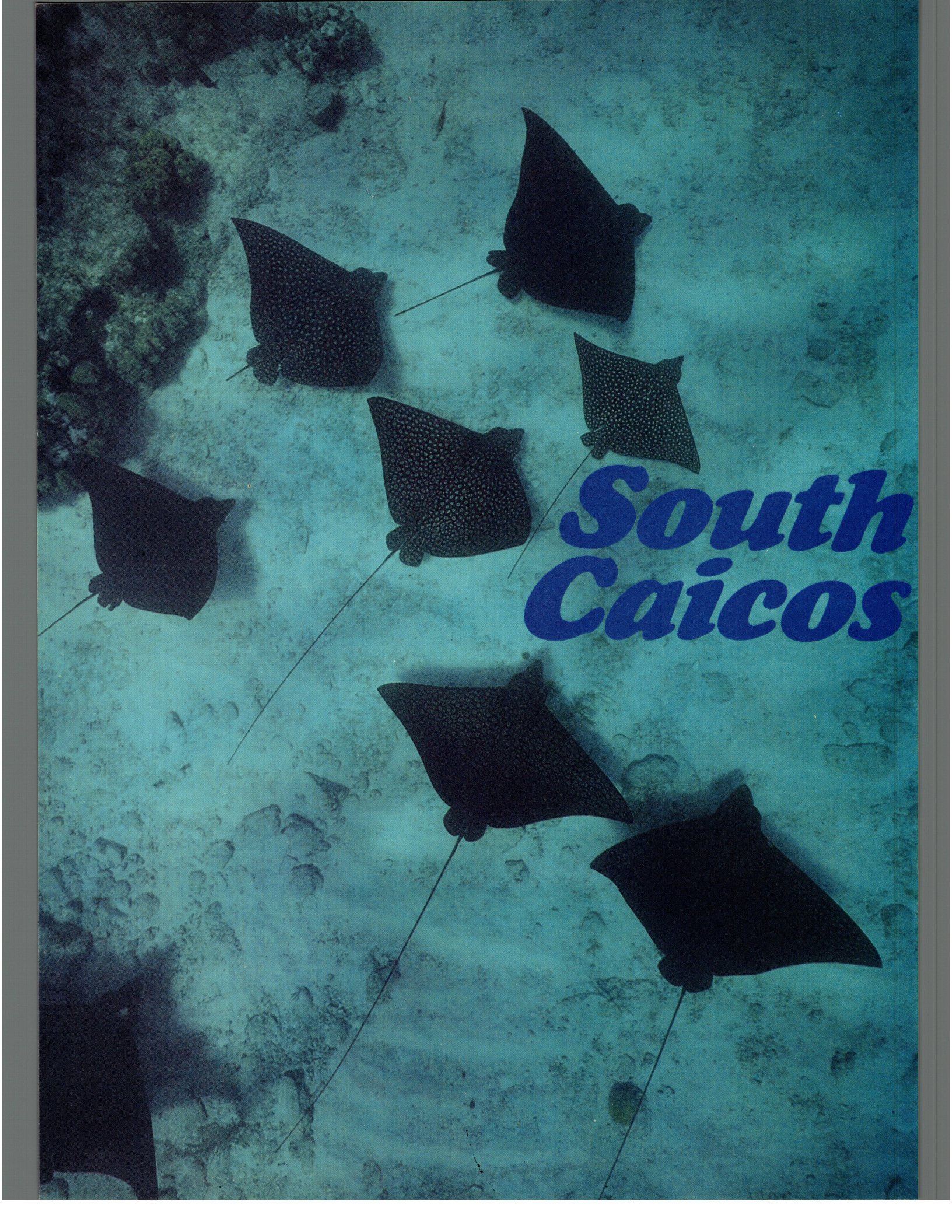
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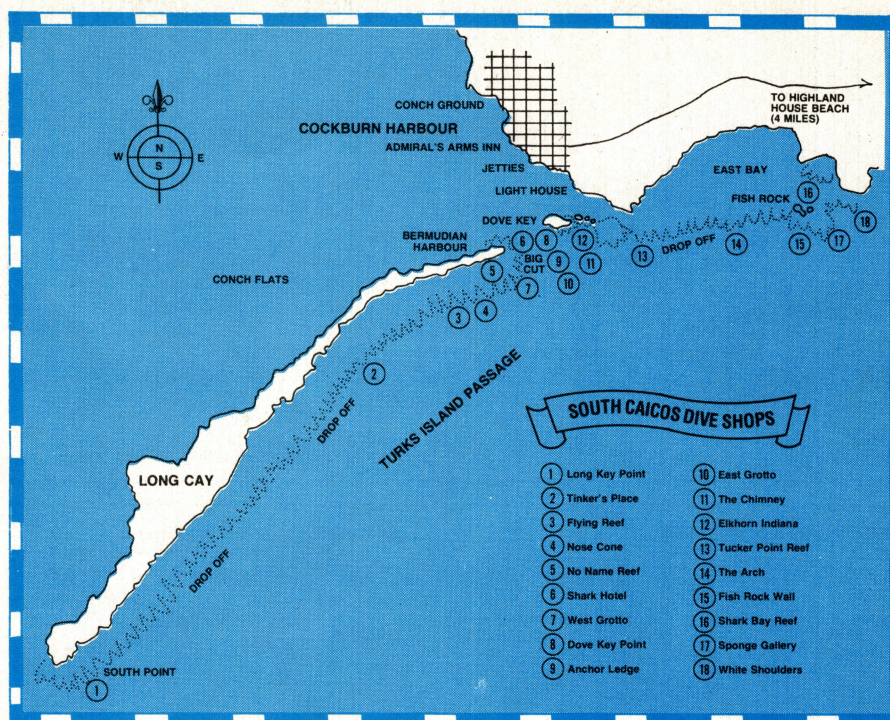
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An underwater photograph showing several stingrays swimming over a sandy ocean floor. The water is a deep blue-green color. The stingrays are dark with lighter spots on their wings. The title "South Caicos" is written in a large, blue, italicized serif font on the right side of the image.

South Caicos

Almost lost in a vast expanse of sea, halfway between Miami and Puerto Rico, are the Turks and Caicos Islands. The two groups of eight major islands and 30 smaller cays were probably sighted by Columbus, but officially discovered by Ponce de Leon in 1515. Today these tiny specks in the western Atlantic offer some of the finest wilderness diving to be found in the Bahamas/West Indies region.

The Admiral's Arms Inn is on the southwestern shore of South Caicos, one of the three most populated islands. It is fast becoming an in-spot for divers looking for new frontiers and comfortable surroundings. The original building served as a plantation manor house over 125 years ago and is now the nucleus of a 13 room hotel. There is no TV, air conditioning or in-room telephones, but the Admiral's Arms is much more than just a place to hang your wet-suit. This old-world inn is well kept and provincial. It sits on a scenic limestone bluff overlooking Cockburn Harbour and is peaceful and romantic. Popular con-

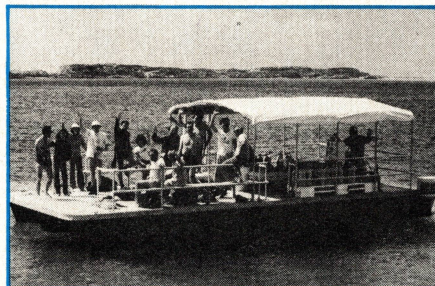


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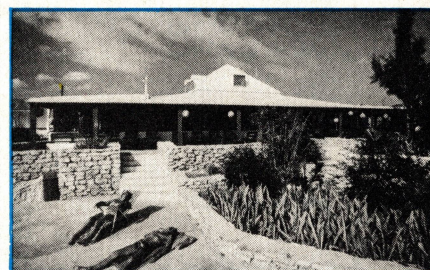
*Text and Photography
by Rick Frehsee*

cessions to modern times include a salt-water swimming pool, taped music and slot machines in the lounge. The menu is tasty and substantial, featuring a lobster dinner in the evening on arrival and departure days. Owned and operated by Turk-Cai Watersports since 1977, the Admiral's Arms is the headquarters for good food and good times in this part of the world.

Since the inn is the largest integrated hotel/diving operation in the Turks and Caicos, it is a comfort to know that the facilities are in keeping with the state-of-the-art in the tropics. The dive shop maintains an inventory of 70 aluminum 80's and full rental gear is available. Two independently operating 15 cfm 5000 psi compressors pump air into an 8400 cubic foot storage bank. The dive boat, docked directly in front of the dive shop, is a 34 x 14 foot triple hull, twin outboard flattop providing room for 26 divers plus gear. The dive sites are usually five minutes from the dock and currents and seas are normally mild. With the exception of arrival and departure days there are three dives daily: a morning departure at 9:00 am for a two tank dive and a 2:30 pm departure for a single tank dive. Night dives are offered at least once a week. The manager and the head



Above, a 34 foot tri-hulled flattop, custom rigged for diving with a side ladder and 115hp outboards. Above right, Air Florida flies 737 jets to the Turks and Caicos Islands. Right, the Admiral's Arms Inn at siesta time. The original building was a plantation house over 125 years ago, and is the hotel's nucleus.



divemaster at the Admiral's Arms are certified PADI scuba instructors and hotel employees are courteous and attentive to all guests. Of particular interest is an excellent slide program on the local environment offered by the divemaster one night each week.

South Caicos diving offers more than its share of beautiful vistas, dramatic drop-offs, and close-up encounters of the marine kind. The 20 plus dive sites named and visited regularly run the gamut from spectacular sprawling coral forests to midwater canyons and breathtaking plunging drop-offs. The corals are healthy and prolific and the shallow formations are particularly interesting and well-developed. Close to Long Cay, Dove Cay and the other exposed rocks at the outer perimeter of the harbor are huge submerged limestone blocks encrusted with corals, sponges and algae and capped with golden elk-

horn. As a result of wave action, deep ledges, small tunnels, potholes and curious overhangs have been formed in the monster rocks. Within a stone's throw of the cays are the impressive mid-reef formations and, in 60-80 feet of water, the vertical drop-off. With the exception of one or two of the deep sites, the formations along the wall are similar to better known areas of the Bahamas and Caribbean. Visibility was always acceptable and occasionally magnificent. My preference of a deep site was a toss-up, for in South Caicos it wasn't necessarily the spot that counted but what might come out of the blue while you were there. The real kick here is the almost unlimited pulse pounding parade of marine life that passes by without preference to location or time of day.

The deep sites, such as East Grotto and West Grotto, are characterized by



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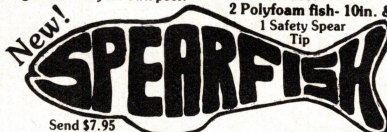
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SOUTH CAICOS

large heads separated by sand channels which lean over horseshoe-shaped cuts in the wall. Down the nearby vertical precipice are shingled and layered leaf, lettuce and star corals accented with purple tube sponges and slender spiraling seaweeds. These are good spots for big black grouper, colorful red hinds, schools of jack crevalle and mighty amberjack. Big silver 'cudas patrol the drop-off and occasionally African pompano and open water sharks are sighted. Whatever turtles like is here in abundance, for the South Caicos wall is one of the best spots for encounters with green, hawksbill, Ridley, and loggerhead turtles. The latter species is frequently observed in excess of 300 pounds.

The mid-reef sites such as Arch and Anchor Ledge are areas of high relief with huge coral mounds undercut at the sides, occasionally forming caverns and swim-throughs. Many black and Nassau groupers are always around and angel-fish, common jacks, large mutton snappers and big green morays are common. The medium depths offer more bottom time and almost as many turtles and large pelagic fish.

The shallow reefs, located mainly around Dove Cay and Long Cay, are a combination of dense elkhorn reefs, fire coral-encrusted limestone blocks and huge mounds of knobbed star coral.

Along the flats adjacent to the shallow reefs are statuesque pillar corals, twiggy fire corals and beautiful bright blue seaweeds festooned with flamingo tongue snails. The shallows are alive with the gentle rhythm of schooling fish such as snappers, grunts and goatfish, and, with the comical flitterings of some of the largest pufferfish I've ever seen. Common reef fish include blue tangs, parrots, sergeant majors, black durgens and triggerfish. Macro photographers will be challenged by several species of photogenic sea anemones including the beautiful carpet anemone.

The site called Shark Hotel, just outside of the eastern end of Long Cay, is the home of lounging nurse sharks tucked under ledges and in potholes. Large southern stingrays commonly burrow in the sand. My most spectacular personal encounter occurred at the shallow reef called Elkhorn, Indiana — a thick *Acropora* reef off the eastern end of Dove Cay. Here, for several dives, I returned to watch an almost continuous daily procession of spotted eagle rays. Often seen in the shallows from the bluff of the hotel and frequently at all South Caicos dive sites, the spotted rays would travel in schools of up to 12 individuals.

Fish swim but eagle rays "fly" with a bird-like motion of their wings — a graceful rhythm shared only by the manta ray, a larger cousin. One of the most beautiful sights in the ocean is a school of eagle rays moving in arcs and circles along the reef bottom. The record sighting for rays at the Admiral's Arms was a school of 33.

An unusual dive spot is Flying Reef, or the Airplane Wreck, in 45 feet of water off Long Cay. The twin engine aircraft was sunk purposely as a diver's wreck. But, as a result of a recent hurricane, it is not as intact as one might expect. Today, a small section of fuselage and two broken wings are all that remains. Still it is a good spot for friendly Nassau grouper and patient angelfish. There is a lovely five foot pedestal of pillar coral on the inside reef not far from the wreck.

After a few days, a Highland House beach dive is a good change-of-pace activity that can be substituted for an afternoon reef trip. About four miles east of the hotel, atop a cactus rimmed hill, is the Highland House. An abandoned 200 year old headquarters for a salt operation, it was later used as a resort hotel for government personnel. A little antehouse to the side served as the first guest house on the island. Two hundred yards away is a U-shaped cove and a beach of creamy white sand. Snorkelers and scuba divers who snake through the coral-crowded shallows are rewarded with giant dome corals and a mini drop-off just 100 yards offshore. Here there were more eagle rays, which I almost began to regard with indifference, and a five foot bull shark which had my full attention. I cornered the shark in a small coral cove and when it made a dash for freedom I grabbed a shot with my Nikonos. I thought the shark had passed very close, but the resulting photograph showed it 10 feet away.

When not diving, eating or cavorting with other divers at the inn, try a stroll through the town of Cockburn Harbour. The people here are so genuinely friendly that it is appropriate to wave or say hello to everyone you pass along the way and if you wander far it's a safe bet you'll get a ride back to the hotel with a passing motorist. Other local scenery of interest includes the vast salt ponds and old derelict windmills east of Cockburn Harbour and the rays that jump in the harbor in front of the inn against an orange sunball sinking and sizzling into the Western horizon.

Air Florida serves the British Commonwealth of the Turks and Caicos Islands. Attractive, all-inclusive diver and non-diver packages and assistance in securing the best air fares to South Caicos for individuals or groups are available from: Co-Pilot Travel, 6201 Leesburg Pike, Falls Church, VA 22044. Telephone toll free in Virginia, (800) 336-0173 and in the DC area; (703) 533-8500. Try South Caicos for underwater action and topside tranquility.

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DIVE MEDICINE PROGRAMS

Human Underwater Biology, Inc., headquartered in San Antonio, Texas, will offer two more Diving Medicine in Depth programs for physicians in 1981.

One conference will be hosted by the Flamingo Beach Hotel and Dive Bonaire, September 19-27 on the island of Bonaire, N.A. A second course will be conducted at the Riding Rock Inn on San Salvador Island in the Bahamas, December 5-12.

For program brochures and complete information, write to: Human Underwater Biology, Inc., Dept. 1250, P.O. Box 5893, San Antonio, TX 78201; or call collect (512) 492-9395.

TROPICAL ADVENTURES

Tropical Adventures has recently announced its dive vacation itineraries for the next few months: Honduras — July, 1981; Fiji — September, 1981; Cozumel — November, 1981; Grand Cayman — December, 1981; Micronesia — February, 1982.

Persons interested may contact Bob Goddess, c/o Tropical Adventures, 624 Joshua Green Building, Seattle, Washington 98101; or phone (206) 682-7067.

PADI COURSE/COZUMEL

Doug Nidros of Ukiah Skin & Scuba is offering a full PADI certification course in Cozumel July 11-18. The program arrangements were organized by See & Sea Travel of San Francisco.

The seven night program will include three full days of basics in the pool followed by three days of ocean diving with three tanks each day.

For further details contact See & Sea Travel.

WALLINS/SEE & SEA TO PHILIPPINES

Karl and Jill Wallin will be leading a trip, organized by See & Sea Travel, to the Philippines the last two weeks of July. The group will spend two days in Manila and then travel by airconditioned bus to Batangas to board the *Sea Quest* dive boat. The group will spend 12 days aboard, diving the east coast of Mindoro. A stay at the Dari Laut, floating resort, is scheduled on the return trip.

Noted underwater photographers, the Wallins will provide instruction and advice on photography for those needing it and will carry extra Nikonos cameras, wide-angle lenses, and strobes for the use of the group.

For further information contact Karl or Jill Wallin, Wallin Divestore, 1656/58 El Camino Real, San Carlos, California; (415) 592-7606; or See & Sea Travel, San Francisco.

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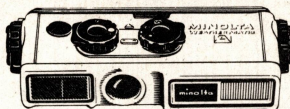
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SEA SAFARIS MOVES

Sea Safaris has assumed new, larger office space at 3770 Highland Avenue, Suite 102, Manhattan Beach, CA 90266. The telephone number remains (213) 546-2464.

The move and expansion has taken place just prior to Sea Safaris' third anniversary. The travel service has offered dive tours to both groups and individuals. Destinations currently include: Micronesia, Tahiti, the Caymans, Cozumel, Bonaire, Australia and the Maldives.

PRIDE PACKAGES

Gary and Ilene Adkison have joined the staff of the Pride Foundation (Protection of Reefs and Islands from Degradation and Exploitation) of Pine Cay, Turks and Caicos Islands. They operate Pride Divers, a diving and snorkeling facility devoted to conservation and marine education.



Pride Divers offers summer group packages including scuba diving and snorkeling on Pine Cay's virgin reefs, complete scuba gear rentals, excursions to uninhabited cays, scuba resort courses, U/W photography, darkroom facility, slide shows, educational films, seminars and accommodations at the exclusive Meridian Club Hotel.

For more information, write: Gary Adkison, Pride Divemaster, c/o Pine Cay, P.O. Box 523290, Miami, FL 33152; or call Ocean Quest Tours and Travel, Inc. at: (800) 526-1394.

SOTO'S PHOTOS

Bob Soto's Diving, Ltd., Grand Cayman, BWI, announces the expansion of its dive facilities to include an innovative underwater photography program. Martin J. Sutton, who operated an underwater photo center in the Red Sea, has joined the staff to manage the teaching of underwater photography classes to divers.

The Soto Dive Shop, at the Cayman Islander Hotel across from Seven Mile Beach, will be the headquarters of the new operation, called Soto's Photos. In addition to the instruction, a comprehensive line of rental underwater photography equipment will be offered.

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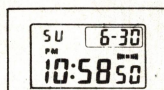
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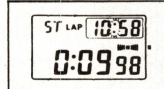
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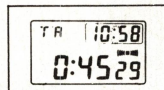
Watersports W-150C with solid stainless steel case and tough black polysulfone band is available for \$59.95, and for \$69.95, you can own the Watersports W-150 with solid stainless steel for both the case and band.



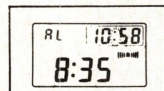
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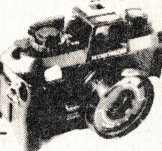
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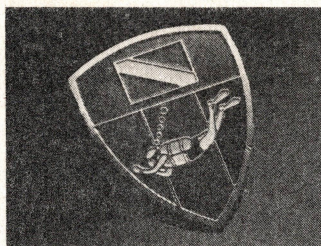
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Lake Mich

BY PEGGY KECKLER MEDEL

Discovering sunken treasure is the occasional idle dream of most scuba divers. Jerald Fredericks was no exception, but the dream turned into reality in his case when his plunge for pleasure led him to recover a treasure in the form of a flintlock rifle. The reality could easily have become a nightmare because of Jery's ignorance about the care needed in handling the ancient object.

The Lake Michigan water was unbelievably and uncharacteristically clear at noon on September 30, 1979. Although the area around Petosky is popular, it is not famous for visibility. But on that particular autumn day, Jery estimates he had a 20 to 25 percent field of vision. On the surface waves tossed the divers' buoy wildly, but down at 50 feet, the water was calm. Even though light was minimal at that depth, lack of plant life added to the clarity of shapes and to visibility.

Jery and his dive partner, John Pollock, had just about exhausted their air supply when John signaled for ascent. Jery grimaced, reluctantly nodded and then took one last wistful look over his shoulder at the boulder strewn lake floor. Jery is always hesitant to end any dive which is strictly for pleasure. He is a Branch County Sheriff's deputy and in the line of duty must dive to recover drowning victims. Therefore, many of his dives are not happy ones. The consequence of that moment of hesitation and the resulting glance not only may alter Jery's financial status but is also on its way to restoring a lost part of America's history.

When Jery first saw the submerged object, it appeared to be a pipe lying across two rocks, but clear examination showed it was a gun — and a very old calcium encrusted flintlock at that. Jery and John passed the rifle back and forth excitedly and then surfaced to get a better look at the treasure. Jery remembers almost losing the gun as he struggled to swim in the tossing waves on the surface.

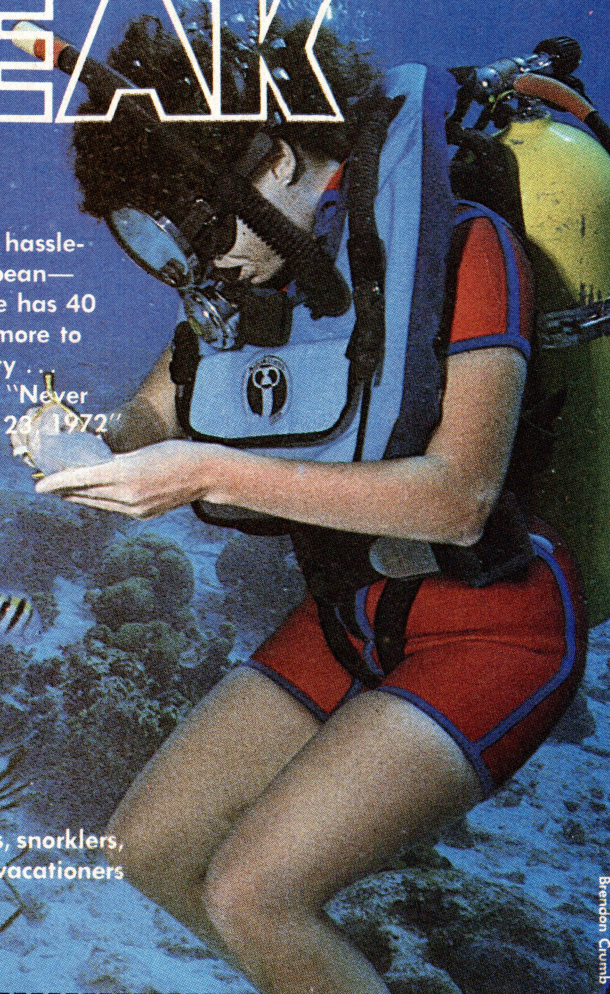
By the time they got to the beach, the other members of their dive class had returned from Petosky where they had gone to fill their tanks. The ten members of the party had been diving to meet requirements for open water certification. Jery and John were the only divers trying for the advanced certificate. They had been to Petosky before, and Jery and John were prepared for the possibility that a nearby dive shop might be closed if they needed more air. With that in mind, they had brought along two extra

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Michigan Treasure



tanks to avoid the trip into town.

All of the divers were excited about the gun, but not one of the men then realized what a valuable and historically important item Jerry had recovered. As the men prepared to return to lower Michigan, Jerry says he more or less threw the gun into the back of the car with the dive equipment. All he could think of at that point was how good the rifle would look mounted on a piece of barnwood over the bar of his newly purchased home in Coldwater, Michigan. Now he is amazed and dumbfounded that he could have approached the gun so carelessly — especially since he is a gun enthusiast and a member of the American Rifle Association.

The next day Larry Booher, Jerry's friend who also happens to be a professional photographer, volunteered to take pictures of the gun for the fun of it. The two men proceeded to hang the delicate old flintlock in tree branches and on a barn wall to achieve artistic effects. "Can you believe we could have been so careless with something so valuable?" Jerry asked later.

A couple of days later, Jerry took the gun out to May's Gun Shop to play a joke on his friends Donald and Peggy May. He laid the corroded and nonfunctional firearm on the counter and demanded that they have it repaired, cleaned and ready for deer season. After everyone stopped laughing, they passed the rifle

around for a closer look.

David Cockrell, a customer in the store and a gun collector, recognized the rifle as being an Indian trade gun. He suggested that Jerry take the antique to Bob Travelbee, a locally recognized expert. Travelbee, in turn, took one look at the gun and said, "That should be in a safe somewhere."

At that precise moment, Jerry realized that he had found more than a bar decoration, and dollar signs began to dance through his head. Travelbee further identified the flintlock and loaned books to Jerry so he could discover facts about the rifle for himself. These books confirmed the rarity of the gun. One of these books, *Early Indian Trade Guns: 1625-1755* by T. M. Hamilton, contained numerous references to archaeological research on gun fragments being done at Michigan State University. Jerry put together a written description of the gun and sent it along with Booher's pictures to the University on October 9, 1979.

Two days later Jerry received a written reply from an enthusiastic Dr. William Lovis, Curator of Great Lakes Archaeology. That letter stated, "Your find is extremely exciting since to my knowledge only one or two even relatively intact firearms of this type have been recovered and documented. It is therefore valuable both monetarily and scientifically."

The letter continued, "Based on your excellent photographs, I have come to a tentative identification of this weapon . . .

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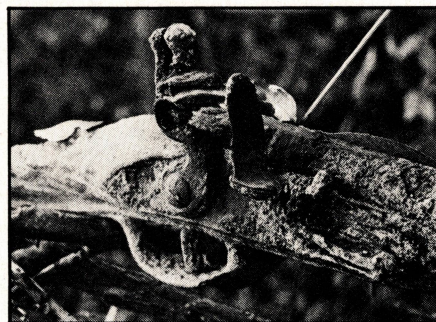
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MICHIGAN TREASURE

I believe your firearm is approximately from the second quarter of the 18th century (1725-1750) and is probably French in origin. The weapon is probably not a military weapon, but either a higher grade gun used for the Indian trade or a 'Bourgeois' gun used by European traders. In sum, you appear to have an excellent example of a rare, early 18th century traders' or trade gun . . ."

Lovis then stated, "This firearm is probably quite valuable as a collector's item. To be frank, I do not feel personally competent to place a monetary figure on this weapon." Dr. Lovis went on to stress



the importance of preserving the gun properly before deterioration could take over. He also suggested that Jerry consider loaning the gun to the MSU museum which would preserve the artifact in exchange for the opportunity to record important archaeological information. He stated, "We would make full photo documentation, drawings of any engravings, and perform x-ray analysis on the lock and other furniture."

By this time Jerry was getting more than a little nervous about having the gun lying around his house, so he agreed to let MSU handle the restoration. On October 18 he handed the flintlock over to Dr. Lovis.

Recently, Jerry, Larry Booher and this article's author traveled to Lansing to visit the rifle and the museum staff. Dr. Lovis guided us through a labyrinth of rooms and corridors until we came to a small, recessed room. There the rifle was lying on a lab table nestled in a bed of cotton batting with a large sign beside it proclaiming, "Do Not Touch." Leaning over the gun carefully, painstakingly brushing the wooden stock with a fiberglass brush was Ellen Dale, a petite artifact conservationist who looks as delicate as the work she does.

Ellen expects, with luck, for the restoration and categorizing of the gun to be finished this summer. The process has been slow by necessity. For example, she had to send a sliver of the wood stock to the MSU Forestry Department for extensive analysis and expects to hear that

the wood is either maple or walnut. After the type is certain, she will have a better idea of how to consolidate and preserve that particular part of the gun by using resin.

She also explained that removal of the lime must be done by hand by slowly alternating various types of acids and distilled water. Every step must be approached carefully and with the utmost professionalism to make sure that no damage is done and so that the existing metal stabilizes. Ellen pointed out that the calcium encrustation on the gun had aided preservation, and Dr. Lovis added that the weapon probably had originally been browned, which stops rusting action, rather than blued.

If necessary, Ellen will use a water emersion electrical current process called electrolysis to complete rust



removal. She is extremely concerned about making sure that the rusting is stopped on the inside of the gun. "You can make the outside pretty and ignore the rust on the inside, but the inside will eventually rust out and destroy the whole item if you aren't careful," she stated.

So far, Lovis and Ellen have not attempted to get into the barrel of the weapon. X-rays have shown that it is empty and indicate that the gun was fired just before it was dropped or thrown into the water.

Cleaning at this stage has uncovered a German silver stockplate which depicts a hound and a hare chase scene plus a floral pattern and a beadwork edge. The cock also has a floral motif and a stylized tree engraved on it. More engraving appears on the unusual sterling silver thumb plate in the form of a queen's crown and insignia.

The gun is amazingly complete if you consider how long it has been under water. For example, the smooth bore barrel of the 50 caliber gun is 41 inches long and is believed to be complete. Additionally, the reddish wood stock runs the full length of the unobstructed barrel and is tapered at the terminal rampipe. Very little of this stock is missing. To continue, the two rampipes are complete on the gun and parts of the ramrod are in the cast iron rampipe. As an added bonus, the trigger is still on the gun and appears to be a set-type, and the original flint is still held in the jaws of the hammer by a

(Continued on Page 114)

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SAN SALVADOR DIVE BOAT FLEET

Dick Batchelder, president of Columbus Landings Service Co., recently announced the acquisition of San Salvador's fifth custom dive boat. This Bahamas dive resort now has the largest fleet of custom dive boats in the Bahamas. All five boats are Bluewater flattop designs incorporating special features for scuba diving convenience. The vessels are 34 feet long by 12 feet wide and powered by twin 115 hp outboard engines.

The first flattop was delivered to San Salvador Island in 1975 and has been operating continuously ever since. During the following years additional boats have been purchased and put into service as the popularity of this dive resort continued to grow. Each boat is equipped with a full complement of life jackets, a VHF radio, first-aid kit, emergency oxygen supply and full tool kit. Each boat is skippered by a Bahamian captain and the diving is under the supervision of one of San Salvador's six certified divemasters.

The acquisition of the latest dive boat in the spring of this year has helped to reduce the passenger load for each vessel to a comfortable complement of 16 divers. The additional boat also helps to expand the variety of locations visited on any given day. The resort is now in the process of equipping a special boat for snorkelers and swimmers who are interested in visiting shallow coral gardens or beachcombing.

For more information about the dive facilities and programs at San Salvador, write to: Columbus Landings Service Co., P.O. Box 1492, Ft. Lauderdale, FL 33302. For reservations and information, telephone U.S. toll free (800) 327-2724; Florida residents call (305) 524-4629.

CAYMAN ISLANDS PIRATES WEEK

The Cayman Islands have scheduled Pirates Week, the British Crown Colony's national festival, for October 24 through 31 in 1981.

This will be the fifth annual Pirates Week to be held in the three-island colony located 480 miles south of Miami.

Festivities begin with a colorful Pirates Landing when the rakish rogues take over the British Crown Colony and include parades as well as land and underwater treasure hunts. District days (mini-festivals) will be held throughout Grand Cayman and the sister islands of Cayman Brac and Little Cayman. These will include coconut-shucking contests, plenty of native food and grog to eat and drink and a gala costume Pirates Ball finale.

Agents may make reservations through the Cayman Islands Reservation Service, nationwide toll-free (800) 327-8777; in Florida toll-free (800) 432-4858; in Miami (305) 448-3634.

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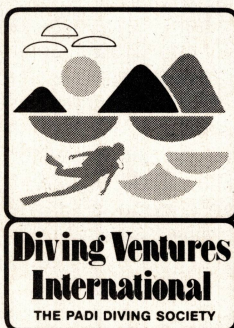
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Scuba Quiz

Category: Instrument Consoles

By Dennis Graver

Instrument caddies have gained popularity in recent years and there are now many from which to choose. Some consoles are manufactured with integrated gauges, while others may be assembled from individual components. Do you know all the things you should and should not do with this relatively new accessory? This month's quiz is to educate you or refresh your knowledge about instrument consoles. The answers are on the following page.

1. Instrument consoles are used by divers because:

- ☐ A. Instruments are consolidated in one place
- ☐ B. The wrists are freed of instruments
- ☐ C. The nuisance of straps is eliminated
- ☐ D. All of the above

2. Clearance space or an opening is required behind which of the following gauges in a console?

- ☐ A. Submersible pressure gauge
- ☐ B. Depth gauge
- ☐ C. Compass
- ☐ D. Thermometer

3. A strain relief sleeve at the regulator end of the console hose:

- ☐ A. Should always be used with a console because of increased weight on the hose
- ☐ B. Should be used on the hose because it is an OSHA requirement
- ☐ C. Should not be used with a console because it affects accessibility of the instruments
- ☐ D. Should only be used on a console if specified by the manufacturer

4. When making an entry into the water, a diver should:

- ☐ A. Have the console attached close to the body
- ☐ B. Hold the console in one hand
- ☐ C. Check the instruments before hand
- ☐ D. A or B and C

5. Which of the following practices can cause damage to a console containing a submersible pressure gauge, a bourdon tube depth gauge and a compass:

- ☐ A. Banging the console against hard objects
- ☐ B. Lifting or pulling the scuba unit by the console hose
- ☐ C. Air transport in an unpressurized container
- ☐ D. All of the above

6. During use, a console should be:

- ☐ A. Allowed to hang freely for ease of access
- ☐ B. Attached to the tank harness or a tank-attached flotation device
- ☐ C. Attached to a front-mounted personal flotation device
- ☐ D. Inserted into a pocket or holster on the hip

7. When using a compass that has been mounted in an instrument console:

- ☐ A. The long axis of the console should be aligned with the centerline of the body
- ☐ B. The long axis of the console should be perpendicular to the centerline of the body
- ☐ C. The compass should be removable for navigational purposes
- ☐ D. Any of the above

8. If, during a dive, a profuse air leak occurs where the hose attaches to the console, a diver should:

- ☐ A. Shut off the air and make an assisted ascent
- ☐ B. Make an emergency swimming ascent
- ☐ C. Signal his or her buddy and make a normal ascent
- ☐ D. None of the above

9. Which of the following statements regarding the care and maintenance of a console with a submersible pressure gauge, bourdon tube depth gauge, compass and timing device is false:

- ☐ A. The instruments in a console should be rinsed with fresh, clean water following a dive
- ☐ B. Sunlight will not cause damage to the instruments in a console
- ☐ C. Scratches in the faces of console instruments are not a serious problem
- ☐ D. A console should be protected with padding when packed for transporting

10. Which of the following is the most significant disadvantage of having instruments in a console:

- ☐ A. The instruments are expensive
- ☐ B. The console is bulky
- ☐ C. The instruments are passive devices
- ☐ D. The instruments can be damaged easily

Scuba Quiz

Answers: Instrument Consoles

1. D. All of the above. Instruments on the wrist frequently snag on various objects underwater. It takes extra time to gear up when instruments need to be strapped on, then the gauges tend to loosen at depth due to wetsuit compression beneath them. Freeing the wrists and consolidating the gauges in one location are definite equipment improvements worthy of consideration by all divers.

2. A. Submersible pressure gauge. There is a bourdon tube inside the submersible pressure gauge and the tube is made of thin metal. If the tube should rupture, high pressure will be released into the gauge case. To keep the face of the gauge from blowing out and causing injury, a blow-out plug is incorporated into the back of the pressure gauge case. Be sure to keep the blow-out plug area clear when mounting a console on a submersible pressure gauge.

3. A. Should always be used with a console because of increased weight on the hose. The console hose is under high pressure and the weight of all the instruments can cause damage to the fibers in the hose, especially at the point where the fitting is crimped onto the hose. A strain relief sleeve will greatly extend the life of the high pressure hose and should be used on all regulator hoses, but especially on the console hose.

4. D. A or B and C. I have seen divers make entries and catch their consoles on part of the boat during the entry. You would be surprised at how this changes a diver's immediate plans. To prevent this unnecessary hazard, know where the gauge is during your entry. All gauges should be checked beforehand. A good time to do this is when the regulator is attached to the tank and the air turned on.

5. D. All of the above. Each of the named instruments is sensitive to shock. A depth gauge can be damaged by transporting it in an airplane in an unpressurized container. Pulling on the console hose can cause a leak to occur where the hose connects to the console. A console is comprised of delicate gauges and should be treated accordingly.

6. B. Attached to the tank harness or tank-attached flotation device. Do not let the console hang freely. As previously mentioned, it can get caught on things, both above and below the water. By attaching the console to the tank harness or tank-attached flotation device (or to the tank), the scuba unit can be removed and will not be connected to the diver by an additional point.

7. A. The long axis of the console should be aligned with the centerline of the body. To increase the accuracy of a compass, extend the lubber line. By aligning the lubber line with the long axis of the console, the accuracy of the compass is improved. Hold the console by pulling it as far forward as possible and pressing the elbows tightly and evenly against the ribs. Sight over the compass and you should be able to navigate with good accuracy.

8. C. Signal his or her buddy and make a normal ascent. It is standard to include a restricted orifice in the high pressure line. While a high pressure leak may appear serious and makes lots of noise and bubbles, the rate of loss of air is not all that great. The ascent should not be delayed, but the situation is not an emergency. Make a normal ascent and repair the leak with a spare O-ring carried in your spare parts kit.

9. B. Sunlight will not cause damage to the instruments in a console. This is incorrect. Left in sunlight, the liquid in a dive compass will expand, leak or distort the compass capsule. The same thing can happen to liquid filled depth gauges. Also, sunlight breaks down rubber goods and can affect the console hose. Sunlight isn't good for any gear, including consoles. Keep your gear in the shade when not in use.

10. C. The instruments are passive devices. A console can provide information on dive duration, depth, direction, temperature, and the amount of air remaining. However, none of this information will be known if the diver doesn't look at the instruments. It is important to develop the habit of looking at console gauges frequently during a dive to check depth, direction, and air supply. Problems in diving begin with surprises. Use your console properly and you won't be surprised.

The console is in widespread use in diving. I hope you have one, use it properly and answer every question in this quiz correctly. The type of information presented is the kind all divers need to know and typical of that learned in an advanced diving course. This is just one more reason why continuing education programs are increasing in popularity. Be sure to take good care of your instrument console so it can take good care of you.

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Fishbowl of the Bahamas

Text and Photography by Rick Frehsee

With over 700 islands and nearly 1000 square miles of coral reefs, a scuba diver could spend a lifetime exploring the undersea world of the Bahamas. A more reasonable approach is to find strategic spots for periodic visits where much of what the Bahamas has to offer will come to you. A good place to start is the Chub Cay Club at the southernmost end of the Berry Island chain.

The Berries sit at the northern edge of the Tongue of the Ocean. This huge, deep, underwater canyon cuts up between Andros and New Providence Island (Nassau), to within a few hundred yards of Chub Cay. The result is an assortment of large fish and a profusion of open water marine life earning Chub Cay the title, "The fishbowl of the Bahamas." This is well known to sportfishermen and tournament anglers who were first to discover the marine life here and helped to establish a clientele for the Chub Cay Club which has been operating a little more than 20 years. In addition to fishermen, Chub continues to host an assortment of tourists, pilots and yachtsmen exploring the islands between Nassau and Florida. The club offers a wide variety of comforts and facilities: A 5000 foot airstrip serves private and charter aircraft easily from Miami or Ft. Lauderdale (125 miles) or Nassau (30 miles). Bahamasair flies into Chub Cay from Nassau twice weekly. There is a full-service marina with 76 boat slips and boat charters and rentals. The hotel features spacious air conditioned rooms that are furnished tastefully. The electrical current is the same as in the States. A freshwater swimming pool is conveniently located and the Flying Bridge restaurant serves a wide variety of fine food. Two hard-surfaced tennis courts are lighted for night play and peaceful, white, sandy beaches and sparkling shallows surround the cay. This self-contained resort also offers a bar and disco, a commissary, laundry, dispensary and gift shop.

A new and ambitious dive program was introduced about a year and a half ago, and its continued growth and success ensures that Chub Cay will have a place in the hearts and minds of the scuba set. This is not merely an attempt to accommodate hotel guests who want

to go diving, but a commitment to dive travel groups, featuring a competitively priced package with modern equipment and professional personnel.

Chuck and Pris Strong, a young married couple from Texas, are the co-diving directors at the resort. Chuck is an intelligent and athletic scuba instructor who combines professionalism and good times skillfully. Pris, in addition to her position as divemaster, is a trained medical technician. The Strong's are committed to Chub Cay's dive program and have already built a reputation of enthusiasm and good service.

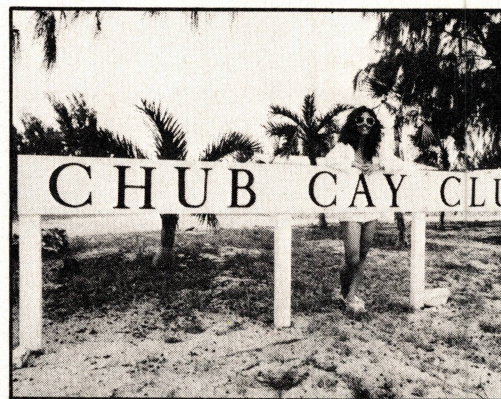
The club utilizes two flattop boats; one 36 foot tri-hull that carries 20 divers and one 26 foot twin hull for 8 divers. The dive boats are within one minute of the rooms, directly in front of the dive shop. Dive gear can be stowed overnight in the shop: the scuba tanks remain and are filled on the boat via extension hoses from the compressor. There is one 20cfm compressor and bank system and one back-up compressor.

The schedule allows three dives per day except on arriving and departing days when two is the normal limit. Two dives are made on the morning trip and one in the afternoon. Avid divers who wish a fourth dive will receive a tank at no extra charge and can make a beach dive. A night dive can be substituted for an afternoon dive on majority vote.

The dive environment at Chub Cay is diversified and exciting. There are exquisite shallow reefs of elkhorn and staghorn corals with large schools of fish; medium depth reefs with beautiful canyons and gullies; and deep reefs with extensive spur and groove systems meandering to a drop-off in 60-80 feet of water. The deep water areas provide big fish and clear water in minimal current. The wall dives offer maximum thrills but there is a wide variety of beach, drift and night diving as well. Most of the popular Chub Cay dive sites are only five to ten minutes from the dock.

Probably the best known dive area at Chub Cay is **Mama Rhoda Reef** — a shallow elongated twin-reef system which has been featured in several Bahamas guide books. Other reasons for its popularity are that it is only a couple of minutes from the dock and it is conspic-

uously marked by exposed rocks. Mama Rhoda is a classic elkhorn reef and a beautiful shallow water dive site. Depths are from 2 to 20 feet and the elkhorn actually breaks the surface at low tide. There is an abundance of long, toothy staghorn coral as well. There is everything you could expect in a shallow reef formation. Of special interest are the schooling fishes like yellowtail snapper, goatfish, grunts, gray snapper, etc. There is also a wide variety of reef tropi-



The welcome sign at the Chub Cay airport.

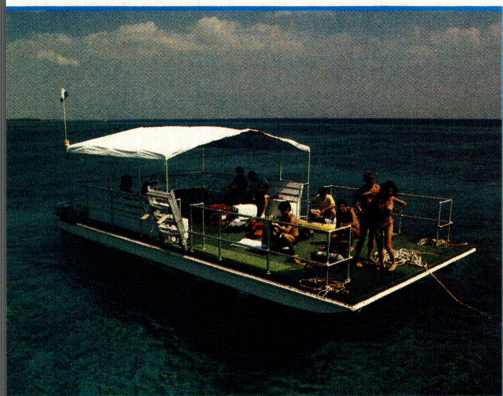
cals and a generous selection of small invertebrates for sightseers and photographers.

The dive sites other than Mama Rhoda Reef are not generally known and for the most part, have only recently been identified and explored. Less than two years ago there were only two or three dive sites named and known as regular spots in the entire area. **Canyons and Caves** is a new, excellent mid-reef dive in 20 to 40 feet of water. This reef features a wide variety of angelfish, Bermuda chub, squirrelfish, sergeant majors, snapper, triggerfish, parrotfish, grouper, barracuda, eels and occasional nurse sharks. Some nurse sharks here approach 12 feet in length, the maximum size for this species. This general area is a wide-angle wonderland with large cuts and caves and huge dome corals adorned with a lush complement of sea fans, sponges, gorgonians, seaplumes and basket starfish.

Chuckles Reef, named for divemaster



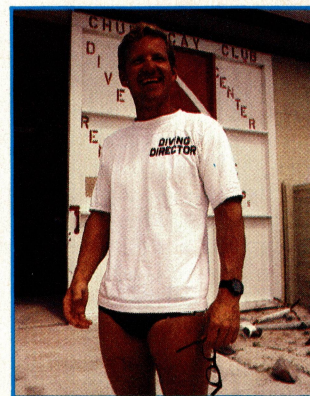
Floating effortlessly and free against a backdrop of brilliant blue, this diver typifies the mood created by a dive on Chub Cay Wall.



This 36 ft. flatboat is ideal for Chub Cay diving.



The Chub Cay Club, showing the dive area at lower right.



Divemaster, Chuck Strong.

Chuck Strong, is in 40 to 70 feet of water. Chuckles is characterized by a huge spur and groove system looking like mountains and valleys. There is a selection of marine life similar to Canyons and Caves and a better chance of seeing larger fish life.

The **Salad Bar** is a deep sloping reef comprised of massive sheets of lettuce and plate corals. This is a good spot to see lots of black coral and a wide variety of marine life. The depths range from 60 to 100 feet.

A good mid-reef site is the **Oasis**, in 30 to 45 feet of water. This is a honeycomb reef formation packed with fish life and marine invertebrates. This highly populated area is a natural for close-up and macro photography. **Anchor Biter** is a site in 50 to 60 feet of water. It is a massive reef, rich in sea life. Other dive sites not personally visited but highly recommended are: **Chub Point Reef**, the **Floral Gardens**, the **Channel Valleys**, the **Gorge** and **Diamond Rocks**.

Perhaps the most unusual dive at Chub Cay and one that offers a change of pace from the excellent reef dives is the **Chub Flats Snorkel**. This is a popular option that can be substituted for the afternoon boat dive. A drift snorkel dive is planned with the tidal current over miles of shallows across the inside bank. In three to ten feet of water divers will pass over an array of visual treats including lobsters, fish, sponges and an abundance of shell life. Many unusual dead shells have been collected on this dive. No live organisms are to be taken, with the exception of lobsters during season, according to Bahamian law.

My favorite spot is an area of the Chub Cay wall which is a frequent deep site for visiting divers. The wall starts at 80 feet and drops vertically into the abyss thousands of feet below. This is the place for big grouper, spotted eagle rays, large barracuda, schools of amberjack, turtles and black coral.

Almost all of our dives on the Chub

Cay wall produced some kind of unexpected visual treat and our last dive there was no exception.

Here, as always, a low profile is maintained by the divemasters who allow a variety of dive plans as long as they are consistent with safe practices. For our final dive we held our depth to 100 feet and monitored a small area of the wall. It was our impression that by limiting our dive area and staying fairly inconspicuous against the coral we could conserve air and increase our chances of seeing something unusual. About 15 minutes into our dive I began to take photographs of a pair of queen angels, meandering along a sand channel at the top of the wall. I was about to unplug my strobe and head up the anchorline when I heard Chuck Strong hooting through his regulator. I spun around to see him, wide-eyed, pointing toward the abyss below. Two large hammerhead sharks swimming in a slow rhythm had just

(Continued on Page 114)

PADI

PROFESSIONAL ASSOC.
OF DIVING INSTRUCTORS

The new kid on the block has grown up. Over the past five years PADI, the youngest of the professional dive instruction and retailer associations, has become the largest in the U.S. as well as worldwide. That is a strong statement, but PADI has the figures to bear it. The association has almost 13,000 instructors certifying over 100,000 students annually. Over 600 stores are PADI Training Facilities. Outside the USA, PADI dive activities are carried out in more than 60 countries. Its headquarters staff of nearly 40 people include specialists in programs, retailing, publishing, finance and computer operation.

The overall impression at headquarters is that of a successful business. A visitor senses the prosperity, the electricity and the feeling that a lot of things are happening. The building is literally bursting at the seams, and plans are underway to move into a new facility, sometime this summer.

How did PADI do it in a recessionary period during which most of the dive industry showed little or no growth? Training director, Dennis Graver, credits an integrated approach that is aimed toward all phases of diving: retailers, instructors and the divers themselves. Equal emphasis is placed on Al Hornsby's training facility program and Graver's instructional program. The result is a steadily expanding growth rate coupled with an upgrading of standards and quality control. If another organization hadn't canceled Ralph Erickson's instructor training course back in 1966, PADI might not exist today. Erickson, a Chicago area aquatic coach and dive instructor, had set up the course in conjunction with John Cronin, then Mid-Western sales representative for U.S. Divers. A last minute decision by the

sponsoring agency scuttled the operation, so the two instructors created their own agency to teach the class. Four instructor institutes were held during 1967, forming the original body of PADI's membership. In order to enlarge the base, certified instructors from other recognized programs were accepted on individual application and recommendation. Today, however, all new PADI instructors must complete an Instructor Training Course (ITC) or a two-day Crossover Course (IOC).

During the formative years, Erickson, presently PADI president and a member of the board of directors, and Cronin worked out of their homes with PADI volunteers to carry out all processing and other projects. Many of the concepts which form the base of the instructional program were developed during that period, including the specialty courses and the advanced diver program. Erickson believed that an incentive philosophy of continuing education was the key to keep people diving. Dennis Graver credits him with the ability to see far into the future. "The fundamental program was laid out from the beginning by Ralph," he says. "All we've done in the past five years is promote it and develop support materials."

Another early innovation was the Positive Identification Card with a photo of the diver laminated to the back. In the old days, many people got certified by PADI to get their pictures on the card.

In 1970, PADI Headquarters moved to Costa Mesa with its first full time staff member, executive director, Nick Icorn. Under Nick's leadership the first instructor training manual was published, the staff grew and the operation became national in scope.

Many questions have been raised about PADI's connection with U.S. Div-

An up-to-date report on the world's largest instructor training association

Text and photography
by Eric Hanauer

ers. I put the question to Dennis Graver and he answered frankly, "There is no relationship. As co-founder, John Cronin remains active and serves on the board and executive committee, but the two organizations are unrelated except that Cronin as an individual happens to be involved in both." Graver went on to explain that all manufacturers benefit as interest in diving is increased, and that is PADI's major goal. Students are not encouraged by PADI to use any particular brand of gear and PADI Training Facilities carry all major brand lines.

PADI's meteoric rise has been strengthened through the close working relationship between Dennis Graver, training director, and Al Hornsby, training facility director, and the close interplay of their respective programs.

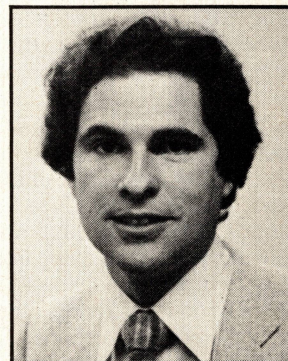
Graver, a modest, self-effacing man, gives credit to his staff, colleagues and predecessors. Dennis began instructing diving in 1966 while working as an electronics technologist in Santa Barbara. Within five years he was directing instructor training courses for NAUI. He joined NAUI headquarters staff as technical director, and soon moved up to assistant general manager. In 1975 he moved over to PADI as director of training, and the changes began almost immediately.

Diver training courses were extensively revised. The basic and open water pro-



Left, the PADI Headquarters staff in front of the current base-of-operations.

Training Facility Director, Al Hornsby.



grams were integrated with a textbook, study guide, quizzes and PADI Dive Tables, all authored by Dennis. "The modular scuba course was a first in the industry," he says. "It doubled our business and gave us credibility."

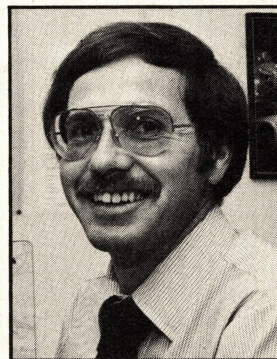
He upgraded standards by instituting ethics procedures and establishing recertification procedures for ITC directors. "Over the last three years," he continued, "we have done more to control the quality of instruction than anyone in the world."

The instructors' manual was thoroughly revised in 1980. Periodic training bulletins serve as a regular update, answer questions, clarify procedures, and survey the membership. Graver also travels around the country conducting instructor workshops, which keep him in touch with what is happening in the field. He explains, "You don't have a dialogue if you stay home all the time."

Graver has been instrumental in implementing the incentive approach which governs PADI scuba courses, offering the diver opportunities to upgrade his knowledge and skill in various aspects of the sport. To begin with, the majority of PADI certifications today are at the open water diver level rather than basic scuba. The additional training is designed to enhance the diver's comfort and confidence and better prepare him/her to con-



Training Director, Dennis Graver.



Comptroller, Gary Prenovost.



Publications Manager, Paul Hill.

tinue in the sport.

The next step is advanced open water diver, in which the student gains practical experience in navigation, night diving, search and light salvage, deep diving and other aspects. The new *Advanced Diver Manual*, co-authored by Graver and Bob Wohlers, was published in 1980 to serve as a textbook for this class.

Specialty courses are designed for divers who wish to continue their educations with more intensive instruction in certain areas. Some other specialties offered include: wreck diving, underwater photography, ice diving, research diving, rescue and equipment specialist. A student who completes five specialties beyond advanced open water qualifies

for master scuba diver certification, the highest award attainable outside the field of instruction.

For those interested in teaching scuba, the steps up the ladder are divemaster, assistant instructor, instructor and open water instructor. Veteran instructors who have met certain rigid criteria can qualify for the coveted master instructor rating.

Al Hornsby brings a wide ranging background to his position as training facility director. When his family moved to Guam in 1962, 12 year old Al had the opportunity to dive everyday and decided this was the way he wanted to spend his life. Today, however, despite the travel which takes him all over the world, his busy schedule restricts diving consider-

ably. "I work on quality instead of quantity," he says with a rueful smile.

While in the doctoral program in counseling psychology at the University of Georgia, Al decided if he was going to get involved in diving, he had best get started. He came to Los Angeles to find the dive industry. He did the usual things like teaching classes and working as a dive store salesman, then served as assistant to the design engineer for Sub-Aquatic Systems, and finally became marketing manager for U.S. Cavalero before coming to PADI. In addition, Al worked as a freelance writer and a professional photographer. "A very scattered resume came together here at PADI," he says. "This job is special . . . a unique opportunity to have a real effect on diving."

The Training Facility Program involves more than 600 retailers. Hornsby explains, "Because we are the biggest, our stores have more going on. We help them provide divers with promotions, travel opportunities, a series of interesting courses, books, publications and referrals all over the world." Additionally, a rating system, the PADI Five Star Program, informs the diver of what he can expect from the store, displaying from one to five stars for qualifications met. The Code of Ethics shows customers strict guidelines for high business ethics. The Pure Air award is earned by having compressor air tested quarterly and meeting standards. Those displaying the Scuba Service star have the facilities and the factory authorization to service every piece of equipment they sell. Community Involvement and Educational Proficiency stars can be earned by sponsoring dive events and by training students to the open water level, with a certain percentage advanced open water or specialty courses. About 15 percent of the stores in the program qualify for the coveted full Five Star Training Facility rating. Once earned, it is subject to annual review and is withdrawn if standards are not maintained.

Working with Hornsby and Jeff Nadler, training facility operations manager, are three Regional Training Coordinators (RTC's), the field representatives for the training facility program. They aid retailers with promotion, quality control and training programs. All come from strong store management backgrounds, and are master instructors and ITC directors. This enables them to work with the instructors as well as acting as dive store management consultants. In addition, Hornsby schedules about ten dive store management seminars each year in various cities around the country. They are attended by some 500 retailers annually and provide opportunities for dialogue between the retailers and headquarters.

Al has recently written the industry's most comprehensive guide to dive retailing. The book, *The Retail Dive Store:*



Above, PADI Dive Manual and Dive Tables. Right, a variety of PADI certifications are offered to upgrade a diver's skills.

Management and Operations, covers all aspects of running a dive store, including financial management, promotion, personnel, marketing and education. Published by PADI, it is available from headquarters.

The name on the logo is PADI International and that's not just a press agent's gimmick. Twenty percent of PADI members are from outside the United States. PADI instruction is currently going on in 60 countries around the world, and nine of them are represented by officially sanctioned agencies. As soon as a base of instructors and facilities is established in a country, PADI allows them to operate independently as long as PADI's strict standards and principles are maintained. These agencies carry on instruction within the country, translate support materials into their own language, and promote the PADI educational and retailing systems.

Promoting the international program in Europe is the responsibility of a foreign liaison, Steve Metcalf. Metcalf started three years ago as a PADI instructor course director, running ITC's by invitation. He averaged three trips around the world for the first two years, with the local organizations paying his expenses.

Once contact has been established by the liaison agent, Al Hornsby follows with dive store seminars which result in certification as PADI Training Facilities. The benefit to American divers is the availability of high level support facilities as they travel around the world.

PADI is the only dive organization with an in-house publishing company. All books, magazines, brochures and train-



ing aids are produced by Paul Hill's department. His staff includes two full time graphic artists and a typesetter. Together, they can carry out projects from inception through photography, design, typesetting, paste-up and layout. Their equipment includes a \$20,000 computerized typesetting machine.

PADI's magazine, *The Undersea Journal*, is published in full color. With president Ralph Erickson serving as publisher and Sonna Whisenand as managing editor, it contains articles of interest by and for instructors as well as news on upcoming PADI activities.

Information about two new major programs will shortly be coming off Paul Hill's presses. The first is dedicated to the diver and will enhance his/her access to both local activities and travel. The second is called the GEM program, and is dedicated to the people who would like to become divers, but are put off by the commitment required by a basic scuba course. GEM stands for Graduated Experience Method, a new entry level



Above left, PADI's growth and activity have put a premium on space at the current headquarters. Above, the computerized typesetting system. Left, Dennis Graver, Joy Lobell Zuehlis and Jean Kester make a decision in the publication dept.



course which falls between the introductory or resort course, for which no certification is given, and the traditional basic class. Persons with GEM cards may dive with certain restrictions, but will be able to get into diving more quickly. Hopefully, many of them will decide to continue their training and become fully certified. PADI and NAUI received matching grants from the Diving Equipment Manufacturers Association (DEMA) to independently develop their entry level courses. The purpose is to make scuba training more accessible to more people and thus enhance the growth of the sport.

PADI's organizational structure allows it to respond quickly and efficiently to needs in the field. The board of directors sets long range goals, but the executive committee is the governing body. The committee meets monthly to make high level policy decisions. Dennis Graver says, "I can go to the committee with an idea. I'll tell them, 'This is what we need, this is why we need it, this is the cost.'

We'll discuss it and six months later we've got it. We don't get bogged down in committees and bureaucracy and personality conflicts."

Day to day decisions are made by the three operating directors: Graver, Hornsby, and comptroller Gary Prenovost. Prenovost, the unsung member of the triumvirate, oversees the financial end of the operation. PADI is a not-for-profit organization, so all proceeds go back into the organization. A non-diver with a strong business background, Gary gets a great deal of credit for PADI's strong financial condition.

New projects are sent in advance to the master instructor review committee and the five star development council for comments and feedback. Some proposals are also sent to the general membership in the form of surveys. Results are tabulated on an informational basis and this input is then used to make decisions and formulate the resulting PADI programs.

Thanks to its staff, most of PADI's pro-

jects have flown high. Al Hornsby describes the staff as "... an incredible group to work with. There's a lot of talent here." Headquarters professional staff, in addition to those already mentioned, includes Jeff Nadler, training facility operations manager; Alex Brylske, training facility projects; Bob Wohlers, ethics and new projects; Scott Nason, computer programmer; and RTC's Mike Engler, Bill McDonald and David Coe.

Recently introduced special activities are of interest to students and instructors alike. Fluid Visions is an annual seminar on underwater photography. The 1981 version was held on the Queen Mary in Long Beach, California. In conjunction with this event is an annual international photo contest held through the training facilities. First prize is a one week vacation at a Caribbean dive resort.

Other special activities have been seminars on Women in Diving and on Physiology in Depth.

I asked Dennis Graver to outline the goals for the organization's future. He replied, "In the last few years we've gotten bigger and better at the same time. One of our goals is as much growth as we can get without compromising integrity and quality. Another is to develop support materials for all our courses, including the higher levels. That's what it's all about; supporting the people who support you." He explained that the effect of PADI's growth is cumulative, with all revenue returning to the association under its non-profit status. Therefore, more growth will mean more staff equipment, resulting in better services for instructors and divers, resulting in more growth. "It's a snowball effect," Dennis explained with a smile, "we just keep gathering momentum." 🐟

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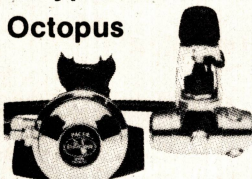
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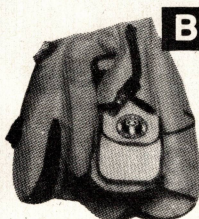
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MICHIGAN TREASURE

(Continued from Page 102)

lead patch. Unfortunately, the manufacturer's mark has not been discovered but that may still appear as more of the encrustation is removed.

Dr. Lovis stressed how lucky Jery was not only in finding the gun but in the fact that he did not break the 255 year old artifact by his careless handling. "I nearly had a heart attack when I saw the picture of the gun hanging in a tree," Lovis stated.

The curator suggests that other divers finding objects they even suspect of being old take certain precautions. First of all, since the item has been under water, it should not be taken out of water but should be transported still emersed in the medium. The preferable solution would be the same water that surrounds it, but if the item had no metal parts, antifreeze would suffice. Unfortunately, Jery took his rifle out of the water, and as a result, the sideplate has fallen off, the wood is shrinking, and the thumb screw has drawn away.

Dr. Lovis made it very clear that Michigan State University's museum does not restore items belonging to private individuals but is doing so in Jery's case because of the nature and historic importance of his find. The museum staff will, upon occasion, identify an item or will direct the owner to a recognized expert.

Anyone who is interested in seeing the rifle should not go to or contact the MSU museum. The artifact is not on display yet and is kept under close supervision plus lock and key. When the restoration is completed, Jery will probably allow Dr. Lovis to display the item for a limited amount of time.

CHUB CAY

(Continued from Page 109)

passed by. Later, we guessed their size to be about eight feet. I had been watching the angelfish and the two sharks had passed by me not 20 feet away. We took off after them, swimming as fast as we dared. Their natural superiority in the ocean was evident. In a last burst of speed, using all my strength, I came within 20 feet of them. Then I had to stop and catch my breath. I didn't get close enough for a good photograph. I had to be content with the memory of those two beautiful forms angling away from me in the deep purple of the Tongue of the Ocean.

Chub Cay is a winner. It's easy to get to, with reasonable rates and a quick, inexpensive flight. Once you're there, you're comfortable, well fed and well dived. The intelligent and gracious dive-masters are anxious to please and delight in introducing divers to the thrill and

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1/4" 3/16"

Sex Age

Height

Weight

___ Ankle

___ Calf

___ Knee

___ Thigh

___ Hips

___ Waist

___ Chest

___ Neck

___ Wrist

___ Forearm

___ Elbow

___ Biceps

___ Ankle to Knee

___ Ankle to Crotch

___ Ankle to Waist

___ Shoulder Seam
to Crotch

___ Wrist to Elbow

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adventure of big fish and deep water action on Chub Cay's reefs.

The club offers attractive three day/two night, four day/three night or eight day/seven night packages. The price is reasonable and all-inclusive. The week package is best but the short packages work well too because of the closeness to Miami. Groups or individuals may book direct or through a sponsoring pro dive store. For information or reservations write, P.O. Box 661067, Miami Springs, FL 33166 or phone (305) 445-7830.

SAM THE CLAM SWEEPSTAKES

Throughout 1980, Dive In Australia ran a competition to guess the weight of an Australian *Tridacna* shell. The prize was a fully paid two week trip to Australia to dive on the Great Barrier Reef. The correct weight was 420 1/2 pounds and the lucky winner was Mike Steinke of Itasca, Illinois. Mike submitted his guess at Our World-Underwater in Chicago in 1980. His prize was presented by Paul Tzimoulis at Our World-Underwater in 1981.

David Loughnan of Dive In Australia would like to thank all those entrants who didn't win and all the people and organizations who helped make the contest possible. Sam's final resting place is soon to be in the office of See & Sea Travel in San Francisco.

KEYS DIVE SHOPS ORGANIZE

Many of the dive operations in the Upper Keys have now banded together in order to promote reef ecology and to increase the professionalism among the members. The new organization, Keys Association of Diving Operators (KADO), will be meeting monthly to discuss solutions to problems of coral reef preservation and ethics for boats transporting divers, and in general to increase the desirability of the Florida Keys as a destination for the diving tourist. For information on KADO or the Florida Keys, or to order the new KADO custom T-shirt at \$7.95, please contact KADO, P.O. Box 1717, Key Largo, Florida 33037.

POSEIDON TO AUSTRALIA

Poseidon Ventures has two special underwater photography tours to Australia. The first tour is scheduled to depart November 6, and will be led by Paul Schutt of Helix. This trip will include ten days of diving from the M/V *Auriga Bay* on the ribbon reefs of the Great Barrier Reef north of Cairns, Queensland, Australia. The second tour (departing Nov. 17) will be led by Jack Chappell of Virginia. It includes 11 days of diving from the Reef Explorer in the Coral Sea and along the Barrier Reef.

For further information call or write Poseidon Venture Tours, 359 San Miguel Dr., Newport Beach, CA 92660; (714) 644-5373 (Collect calls accepted).



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for more information circle #174 on Reader Service Card

United States Virgin Islands

Photo: Bret Gilliam, V.I. Divers, Ltd.



"...the most popular dive resort"

"Skin Diver," Jan. '80

"...the most popular dive resort destination in the world." That's how "Skin Diver" magazine rates the United States Virgin Islands. Write directly to the dive centers listed below for details in their area. For a copy of our 24-page "1981 Dive Guide to the Virgin Islands" write to the Division of Tourism at the address below

St. Croix:

Above & Below, 12 Strand Street, Frederiksted 00840. Tel.: (809) 772-3701
Caribbean Sea Adventures, Kings Wharf, Christiansted 00820. Tel.: (809) 773-5922
Cay Divers, Box 3234, Christiansted, Tel.: (809) 773-5907

North Star Dive Tours, Box 3461, Christiansted 00820. Tel.: (809) 778-2125
Pressure Ltd., Box 3612, Christiansted 00820. Tel.: (809) 77-DIVER

Salty Dogs Inc., 59 Kings Wharf, Christiansted 00820. Tel.: (809) 773-2678

V. I. Divers, Ltd., PanAm Pavilion, Christiansted 00820. Tel.: (809) 773-6045

St. John: (Zip Code 00830)

St. John Watersports, Box 70, Cruz Bay, Tel.: (809) 776-6256

Scuba Ventures, Box 120, Cruz Bay, Tel.: (809) 776-6111

The Dock Dive Shop, Cruz Bay, Tel.: (809) 776-6338

St. Thomas: (Zip Code 00801)

Aqua Action Inc., Wintberg Peak, Tel.: (809) 775-3275

Caribbean Divers, Red Hook, Tel.: (809) 775-1935

Dive Locker, Harms Marina, Red Hook, Tel.: (809) 775-3110

St. Thomas Diving Club at Bolongo Bay, Box 3381, Tel.: (809) 775-1800

St. Thomas Diving Club at Villa Olga, Box 4976, Tel.: (809) 774-1376

Underwater Safaris, Box 7970, Tel.: (809) 774-1350

Virgin Islands Diving School, Box 9707, Tel.: (809) 774-8687

Joe Vogel Diving Company, Box 7322, Tel.: (809) 774-2321

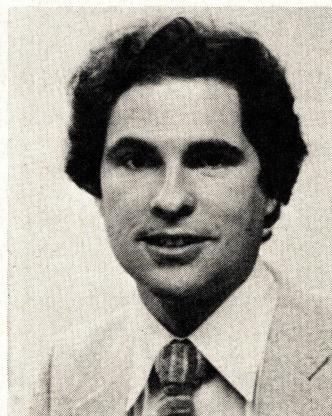
Watersports Center, Box 2432, Tel.: (809) 775-0755

United States Virgin Islands St. Croix • St. John • St. Thomas

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P.O. Box 471269, Miami, Florida 33152

DIVE STORE WORKSHOP IN CAYMAN

The Cayman Islands are hosting a travel workshop for dive store owners during the week of September 26 through October 3. Designated as Scubabowl I, this unique symposium consists of an 8 day/7 night program of lectures, slide presentations, open water dives, island tours and social events sponsored by at least eight of Grand Cayman's most popular dive resorts.



Heading up the list of expert lecturers is Al Hornsby, director of the PADI Training Facility program and well known organizer of dive store seminars. Hornsby will be conducting a series of four lectures on basic travel research, retail promotion of dive tours and management of dive travel programs.



Paul Tzimoulis, Editor/Publisher of SKIN DIVER, will conduct a week-long series of lectures on travel photography. Tzimoulis' subjects will include: how to shoot photos for travel shows; editing slide show presentations; shooting underwater drop-offs; and organizing photo dive tours.

In addition to daily lectures by Hornsby and Tzimoulis, there will be presentations made by at least seven dive resort operations plus specialized lectures by var-

ious Cayman Island experts on such topics as pirate history, marine conservation and dive travel medicine. All workshop seminars will be conducted in the conference rooms at the Grand Caymanian Holiday Inn.



Dive store owners will have an opportunity to sample Grand Cayman's fine coral reefs, shipwrecks and spectacular drop-offs during open water dives conducted every afternoon. Some six to eight dive boats from various Cayman resort dive operations will pick up the dive store owners at Seven Mile Beach and carry them to nearby drop-offs and wrecks just minutes away. A free recreation day will be provided midway through the seminar week so that dive store owners can make an island tour.

Each evening, one of the host hotels will sponsor a social event for the visiting dive store owners. Participating hosts include: The Sunset House, Casa Bertmar, Galleon Beach, Royal Palms, Cayman Islander, Spanish Cove Resort and Grand Caymanian Holiday Inn.

The purpose of Scubabowl I is to better acquaint dive store owners with the various underwater attractions, dive services, and hotel accommodations that Grand Cayman offers. Working in conjunction with Cayman Airways, the Cayman Islands hotel operators have developed a special Scubabowl I package price well below normal travel costs. The prices of roundtrip air transportation and hotel rooms range from \$209 to \$299 for the entire week depending on which hotel is selected and whether departure is made from Miami or Houston. The special seminar package price is based on double occupancy and includes; air fare from Miami or Houston, accommodations, island transportation, dives and cocktail parties. Meals are not included. Dive store owners can select accommodations from one of seven different hotels participating in the program.

For more information and reservations, dive store owners can contact the Cayman Islands Department of Tourism, 250 Catalonia Avenue, Coral Gables, FL 33134, or telephone: (305) 444-6551. The Scubabowl I Symposium is limited to 150 store owners and reservations will be taken on a first come, first served basis. Cayman's Scubabowl I seminar program is limited to bonafide dive store owners (and escorts) and business credentials will be checked.

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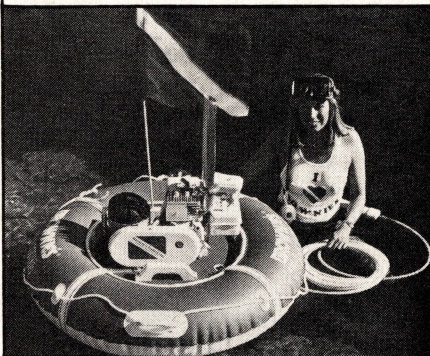


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TRILOGY OF LIGHTS

(Continued from Page 84)

chargeable by simply replacing the battery and bulb (Series 3000 and 3500 models). Check them out for yourself — I think you'll be impressed, too.

The following table may help to compare the features of the new lights (information has been supplied by the manufacturer):

Model	3000 Series	3500 Series	4500 Series
Voltage	6 volt	6 volt	12 volt
Battery	Rechargeable lantern gel-cell	Disposable heavy duty lantern battery (NEDA 908D)	Two disposable heavy duty lantern batteries (NEDA 908D)
Recharge Time (Hours)	16		
Bulb	PL 10278 (Cat. #03-1125)	PL 10313 (Cat. #03-1125)	PL 10315 (Cat. #04-1024)
Burn Time (Approx.)	2 hours	4-5 hours	4-5 hours
Bulb Lifetime (Approx.)	15 hours	15 hours	15 hours
Relative Intensity	3X	1X	3X
Case Length	7¼"	7¼"	10¼"
Case Diameter	3¾"	3¾"	3¾"
Case Color	Yellow, Blue or Orange (for rental programs)		
Weight In Air	3.5 lbs.	2.6 lbs.	4.1 lbs.
Weight In Water	0.4 lbs Negative	Floats Beam Up (About 45°)	Floats Beam Vertically Up
Retail Price			
Pistol Grip	\$75	\$30	\$45
Iron Grip	\$79	\$34	\$49

NOTE: Divers who might want to upgrade their older SE200 with the new faceted reflectors and the hotter, brighter bulbs can do so by ordering these as spare parts. Contact your local dive shop for information.

UNDERWATER WATERFALL

Located in the Bass Strait between Tasmania and Australia, deep beneath the ocean's surface, is the world's largest waterfall. The water spills over the edge of the continental shelf and falls 400 yards to the sea floor below. The section of shelf involved in 93 miles long and the water passes over it at a rate of one million cubic feet per second. The water movement is caused by differences in temperature and salinity between the Bass Strait and Tasman Sea, and the resulting waterfall reaches a top speed of only 2.3 feet per second.

PROFESSIONAL DIVING SCHOOL

The Diver Training Division of
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PDS



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To correct this problem we decided that IUC should have its own Professional Diving School in New York City, staff it with its own diving supervisors and put it under the direct management of IUC Training and Safety Department. To insure that PDS became an integral part of IUC operations, we constructed a modern 8,000 square foot training facility at the companies' World Headquarters on Long Island Sound in New York City. In this unique environment, PDS students became exposed daily to state-of-the-art techniques, diving systems, submersibles and the people who use them.

Results – Qualified Divers

Our solution and its philosophy worked. Today, five years later, we are providing thorough comprehensive training to young men and women seeking to become professionals, at the same time we are providing ourselves with the services of well trained divers, supervisors and other categories of diving personnel in those that we hire to work at IUC.

International Underwater Contractors, Inc., and IUC International, Inc., have hired over 75%* of all graduates to date, and other companies have enthusiastically employed additional graduates. All

commercial diving firms appreciate the value of personnel trained by recognized companies who are in the business of diving as well as the field of diver training. Also, it is current practice at PDS to rotate all instructors to ongoing IUC commercial diving projects, such as offshore oil rigs. This program keeps the instructors current on state-of-the-art industry practices which they can then pass on in the classroom. The bottom line on all this, is that from the period of August '76 to December '80, over 95%* of Professional Diving School graduates were employed worldwide in the diving industry.

Your Employability

We invite you to visit the school or call us, so that we may evaluate you individually and establish your relative employability, based on your previous related experience and successful completion of our program.

We look forward to providing you with realistic and up-to-date information regarding your possible career in Commercial Diving.

* VETERANS ADMINISTRATION AND OCCUPATIONAL EDUCATION DATA SYSTEMS AFFIDAVITS ARE AVAILABLE FOR YOUR REVIEW AT IUC/PDS MAIN OFFICE IN N.Y.

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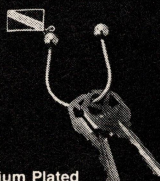
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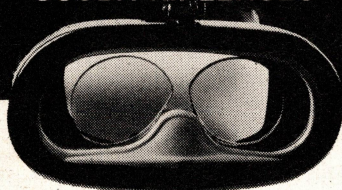
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The prices of the two day and three day packages, respectively, are: \$130/\$210, double occupancy; \$160/\$255, single; \$115/\$165, non-diver; and \$122/\$198 for groups larger than 20. Groups providing their own transportation to marinas and dive sites save \$15 per person.

For more information contact Corsair Divers, c/o Holiday Inn North, 160 Holiday Plaza, Newark, New Jersey 07114 — please call Iggy Rangel at (201) 748-5557 or (11pm to 7am) (201) 589-1000.

POSEIDON TO TAHITI

Poseidon is running dive trips to Rangiroa in the Tuamotu Islands, French Polynesia. Richard Johnson, author of *Sharks of Polynesia*, will lead the group departures from Papeete, Tahiti. The tour features seven days of diving at Rangiroa with additional diving days on Papeete or Bora-Bora as options. Departure dates have been set for Aug., Sept., Oct., and Nov.

For further information write or call Poseidon Ventures Tours, 359 San Miguel Dr., Newport Beach, CA 92660; (714) 644-5373 (collect calls accepted).

CAYMAN NORTHWALL DIVERS

A new watersports recreational facility has opened on Grand Cayman. Patrick Evans, formerly of Quabbin Divers Ltd. has established Cayman Northwall Divers Ltd. The firm operates out of the *Lulu*, a spacious cabin cruiser.

The Northwall Divers conduct snorkeling and scuba diving trips, night dives and trips across Grand Cayman's North Sound with lunches included.

The *Lulu* can pick up guests on the beach at most Grand Cayman resorts.

For information about Northwall Divers Ltd., contact Patrick Evans, Box 157, Grand Cayman, telephone 9-2206.

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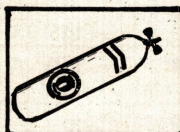
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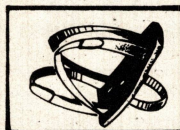
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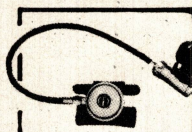
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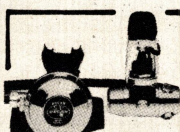
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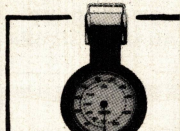
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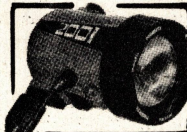
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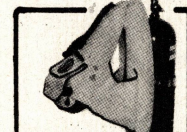
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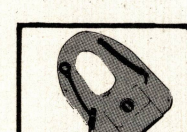
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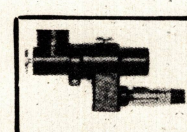
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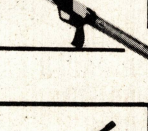
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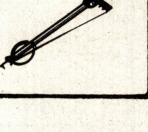
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PINELLAS REEF

(Continued from Page 24)

sight-seeing, and dive shops in the area are not oriented toward tourist divers. This means that out-of-state divers cannot expect to arrive suddenly, unannounced, and expect to go diving the next day — or at their convenience. The World of Water runs only three weekend trips per month. Most other shops run charters, some only once per month. This will no doubt change as demand increases but in the meantime we advise interested divers to phone or write for details and reservations.

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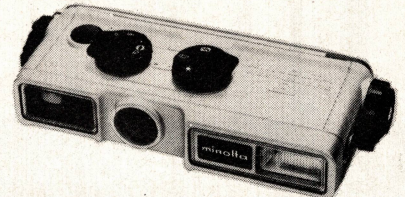
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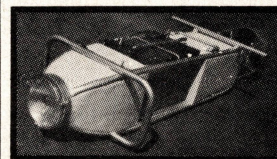
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FOR DIVERS

BY CHARLES V. BROWN, M.D.

HEARTS & DIVERS

Howard K. of Pasadena (he's not shy — we just can't decipher his signature) began diving in '61, paused in '78 for a heart operation, and then resumed diving. Thinking others with a similar problem might be interested in his experience, he graciously wrote in to share it.

It was in '78 that Howard learned why he went through air so fast. He had an inter-atrial septal defect — a hole in the wall between the right and left sides of his heart. About 50 percent of the blood pumped through his lungs and back to the left heart was passing through the hole for a second tour through the lungs — very inefficient. He submitted to the scalpel and is glad of it. He's getting half again more mileage from each scuba tank.

Comment: Howard doesn't know how lucky he was. He'd been leading a charmed life. The magic came not from the good fairy, but from his own sensible dive habits. A septal defect could let venous blood pass from the right heart to the left, by-passing the lungs and entering directly into the arterial circulation. Bubbles would then become arterial gas emboli with potential for mischief depending on where they happened to lodge.

Ordinarily the higher pressure in the left heart assures that any flow through a

septal defect will be from the arterial to the venous side — hence the recycling through the lungs. But if a diver violates the tables too badly, his pulmonary capillaries may become so clogged with bubbles that circulation through the lungs is significantly blocked. The left heart, receiving less blood, will generate a lower pressure, while the right heart, having to work harder, will generate a higher pressure than usual. This will reverse the normal pressure gradient and venous blood will by-pass the lungs.

Autopsy statistics show small, unsuspected septal defects in a substantial proportion of the general population. This is another excellent reason for all of us to avoid pushing the tables.

Question: Michael Bales of Whiteman Air Force Base, Missouri, is 24 years old and has been diving for eight of those years with no problem. Recently he found out that he has a bicuspid aortic valve. Could he be an invalid and not know it? Should he quit diving or observe sissy limits?

Answer: The aortic valve guards the exit from the left ventricle so that blood pumped into the aorta won't leak back into the heart. Normally it has three cusps. A bicuspid valve — a congenital anomaly — has only two cusps. It could leak, reducing circulatory efficiency. And there's the possibility of another heart defect; they sometimes come in groups. Since you have good exercise tolerance, the chances are that your defect(s) aren't all that bad, and you can dive without concern.

However, we wonder how you found out about your bicuspid valve. If it caused symptoms that led you to seek medical help, it could make diving dangerous. Ask a cardiologist or internist who is familiar with dive medicine.

Question: Guido Cole of the Belgian embassy in Mexico belongs to a dive club with some serious thinkers. Their discussions have led to concern about the effect of breathing rate on nitrogen uptake. The calculation of the Navy tables relied upon empirical data from experienced Navy divers. But sport divers who use the same tables are a far less homogeneous lot. They come in all ages, sexes, shapes, sizes, fitness levels, metabolic rates, lung volumes, and breathing habits.

Question: does fast breathing speed nitrogen uptake? **Question:** if so, should not the individual sport diver know the respiratory performance of the average Navy diver, so he can compare his own with it and calculate correction factors to be applied in determining no decompression limits, residual nitrogen times, etc. that would be safe for him?

Answer: For a non-diver on land or a diver saturated at any given depth, nitrogen tension in the body is constant and independent of breathing rate. Not so during ascent. Then each inhalation brings nitrogen at higher tension into his alveoli

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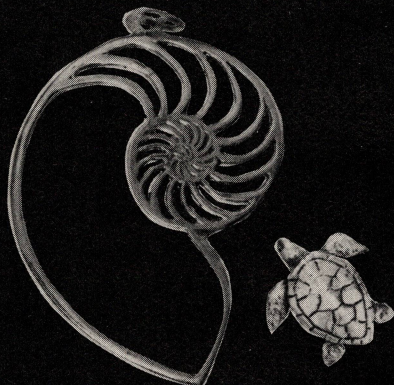
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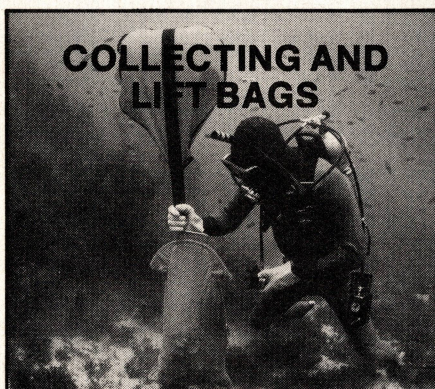
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RX FOR DIVING

and his blood carries it off to the tissues. Breathing faster replenishes this high tension alveolar nitrogen more quickly, so its uptake is speeded.

Increased breathing comes about in two ways. Hyperventilation, common with beginners, is limited because it lowers the blood carbon dioxide level and unpleasant symptoms appear. Beyond a certain point, the diver would have to leave the water, curb his breathing, or risk dizziness, weakness, and blackout. Breathing increases that are necessitated by exertion are limited only by exercise tolerance, and along with increased circulation, can greatly speed nitrogen uptake. Therefore, when planning an arduous dive one should pretend that it will be deeper or longer, and use the next larger table entries than he/she ordinarily would. For example, a 48 foot dive would be treated as to 60 instead of 50 feet and the bottom time allowed would be 60 instead of 100 minutes. The maximum depth for a 27 minute dive would be 80 rather than 90 feet.

During the ascent phase of the dive the nitrogen tension in inhaled air falls below that in blood. Skip breathing (hypoventilation), a habit with some divers who like to save air, would impede nitrogen outgassing and elevate blood carbon dioxide; both increase the bends risk. Hyperventilation on the other hand would aid outgassing, and by lowering carbon dioxide tension would retard bubble formation and growth.

Hard exertion would substantially increase nitrogen elimination, *but only at first*. As ascent continued and supersaturation increased, the physical agitation involved would promote bubble formation and the increased carbon dioxide produced would favor bubble growth. As nitrogen left solution to enter bubbles its tension in the blood would fall, so its diffusion from blood to alveoli would slow. Nitrogen would be retained and decompression sickness invited. Therefore, ascents should be relaxed, with breathing normal or a little increased.

Other suggestions can be made. Physical fitness permits slower ventilation for a given exercise rate, or more exercise for a given ventilation rate, so the less fit should dive more conservatively. Cold increases breathing and nitrogen uptake, so divers should keep warm or, if they don't, give the no decompression limits a wide berth.

Inert gas transport in diving is extremely complex and only partly understood. Even if you could compare your respiratory performance under various conditions with Navy averages, there's no way to calculate corrections to plug into the tables. Given the above guidelines, each diver must decide for himself how

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much extra security he wants.

Question: We quote J. C. of New Orleans: "My newly-wed wife and I are as much into diving as we're into each other. Our honeymoon is planned for the Great Barrier Reef in Australia. Our question is, is there any danger in making love at depth? This is not a joke — we're sure other readers would be interested."

Answer: It's a neglected subject. Our informants attest that sexual activity underwater has been enjoyed and photographed, and we're unaware of any Blue Cross claims for damage therefrom. Nevertheless, there are theoretical hazards. First, since wetsuits would prevent adequate corporal proximity, the couple would risk hypothermia. Second, passion of the moment might exclude thoughts of buoyancy control. The couple would risk sinking into narcotic oblivion, or rising with airways blocked by a breath hold kiss. Finally, it's known that high amplitude vibrations attract sharks. But as we said, it's all theoretical and no conclusions are justified until more data are accumulated.

Question: Jim Eastep of Honolulu was on a diesel powered charter boat when he and several others became ill with nausea, throbbing headaches and lethargy. He suspected carbon monoxide poisoning, but didn't notice any cherry red color of lips or nailbeds.

Answer: Carbon monoxide poisoning must be considered whenever several people exposed to engine fumes become ill at the same time. When wind conditions are right, it's not rare for a boat's exhaust to blow over its deck. The symptoms you describe are consistent. Typically there's a mild headache which becomes throbbing and nausea. Weakness and dizziness follow, and in severe cases, collapse. The traditional cherry red color is absent more often than not.

When there's any question of carbon monoxide, the victims should breathe oxygen, remain at rest, and be transported to a hospital where tests can be run. The best treatment is hyperbaric oxygen.

Question: George Rappole of Fort Worth, Texas, thought readers would like to know about a very unusual dive accident. A student lost his eyesight after surfacing from a checkout dive, then regained it during a seven hour recompression treatment. Is there a simple explanation?

Answer: The cause of the blindness could only have been cerebral air embolism. The student either committed the cardinal sin of holding his breath while ascending, or had an unsuspected lung disorder that trapped expanding air. Standard treatment is immediate recompression to 165 feet to crush the bubbles, then a protracted sojourn at 60 feet, breathing oxygen to help reabsorb the gas and support the survival of nerve cells deprived of normal circulation. Most such victims will recover if treatment is timely. That's nice to know. 🐬

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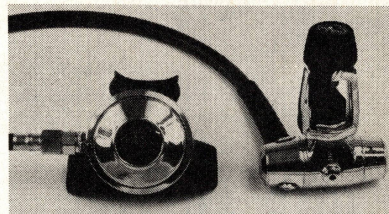
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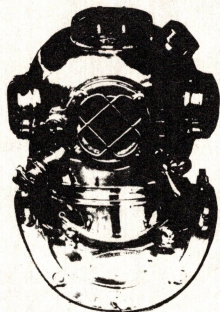


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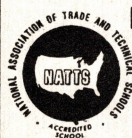
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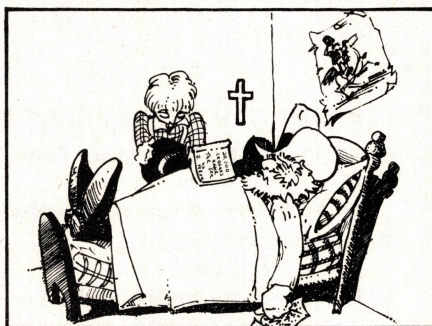
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TAIN'T POISON

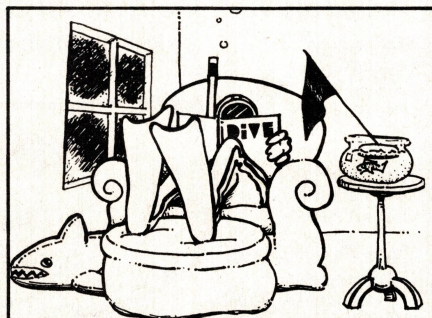
(Continued from Page 42)

of good water in Montana. In 1808 at the mountain man rendezvous on Flathead Lake, Colter introduced his sport to the others present. It seemed to fit in well with squaw chasing and firewater drinking. You might say the 1808 meeting was the first Montana Dive Festival.

"I resume the story. That faded document proved to have been written in 1813 on the day Colter died of jaundice. It was written to his wife, a form of last will and testament. How my grandfather ever got it is beyond me. Basically, the document is an account of a reeding trip to, you guessed it, a pond on Poison Creek. Col-



ter recounts that immediately upon slipping into the water he was stunned by a breathtaking sight. The entire bottom of the pond was covered with gold! He became so excited he forgot about the length of his reed and almost drowned when the end went under. He was equal to the occasion though, climbing out of the pond to cut a longer reed. As he was cutting, his ol' buddies (the Indians)



showed up. Colter must have been thinking instant replay while loping off through the sagebrush — again sans clothes. He escaped, but was apparently unable to return to the pond before he died.

"With such a document in hand, do you think there was a chance of me not becoming a Montana diver? You're right, there wasn't. As soon as I was old

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enough, I was certified and began to search. There was one problem though. Remember that tear? Well, it washed off the location of Poison Creek. Take a guess how many Poison Creeks there are in Montana — 513 — to say nothing of a bunch of Rattlesnake, Scorpion and Spider Creeks.

"One by one, I searched them. Years passed, hundreds remained to be checked, and no gold. Poison Creeks were my poison, and I started to attract a bit of attention with my peculiar diving preferences. Other divers (yes, there are some here) would stop talking when I approached. When they thought I wasn't paying attention, I caught them whispering and pointing. It was a lonely and frustrating existence. It finally got to me, so I decided the obvious solution was to tell them of the Colter story and enlist their support. With the soaring price of gold, there would be plenty for all.

"OK, you say, if there are divers in Montana, where in the sam-hill have they been? Well, it's a known fact that almost all of the Poison Creeks are stuck way back in the hills. Wouldn't do to have 513 Poison Creeks lining Montana's highways. Tourists might think something was wrong and not come back. Ever since I told the other Montana divers about the gold, I can't get them away from Poison Creeks. Fantastic Montana



lakes and rivers, where divers once abounded, see nary a divers flag anymore. So, that's probably why you thought there weren't any divers here — they are all off in the hills.

"Lot of good it does. As of yesterday, we still hadn't found the right Poison Creek. I'd almost despaired of finding it, and was just getting ready to desert the crew for the oceans when the issue with your article arrived. The story on Poison Creek literally jumped off the page at me.

"You know, I think you've found Colter's Lake! I was so excited when I read the article I called all my Montana buddies. Now do you understand why you don't really need any California dive partners up here? By the way, exiled, ol' dive buddy, ol' pal, do you have parking space for 200 Montana divers? And, how about your refrigerator, sleeping accommodations, compressor . . . ?" >>>

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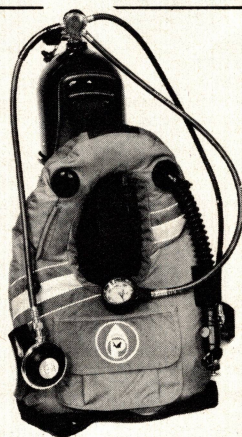
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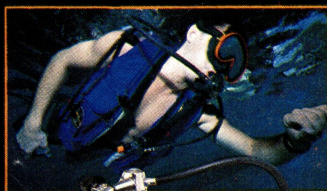
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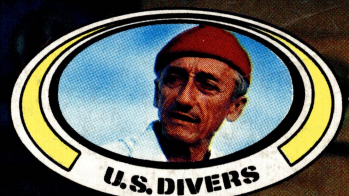


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